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ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
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Agenda Item: B.2.1

Ghana

# TECHNIQUES OF MANPOWER ASSESSMENT: THE APPLICATION OF THE FINDINGS FROM GHANA'S MANPOWER SURVEY

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No.103

B.2.1 "TECHNIQUES OF MANPOWER ASSESSMENT"

SUB-TITLE

"THE APPLICATION OF THE FINDINGS FROM GHANA'S MANPOWER SURVEY"

Prepared by

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Soon after Independence in 1957 the Government of Ghana recognised that shortages of trained workers would almost certainly develop in the wake of the Africanization programme and as a direct consequence of their plans to shift from an agrarian economy to a balanced industrial economy. The Government commissioned a thorough survey of the manpower situation in the country and the first report of these findings was published in 1960. This survey reported on the employment of "high-level" manpower, occupation by occupation, as of March 1960 and included estimates of future demands which might be expected. It also assessed the educational and training facilities available and provided an accurate report of the supply of trained manpower that could be expected to join the labour force during the five year period ahead.

2. In the period since the 1960 Manpower Report other surveys have provided additional information to supplement the initial findings. The Manpower survey was repeated in 1961 to provide trend information and to evaluate progress and changes. This survey covered 90% of those employed in high level non-agricultural occupations in the country. In 1962 a special survey of "middle-level" employees (clerical, sales, fiscal, managerial, etc., employees) was conducted to assess the problems of supply and demand among these occupations. Late in 1962 a survey was undertaken to evaluate all of the programmes and facilities in Ghana related to vocational and occupational training.

3. An accurate and detailed picture of employment, shortages, estimated demands and potential supply has emerged from analyses of these surveys. While the reliability of the employers' estimates of future needs can be questioned the consensus of these projections does provide trend information on broad occupational categories.

4. The broad outlines of Ghana's manpower situation can be summarised as follows:

GHANA MANPOWER SITUATION: 1960-65

| Category | Employed 1960 | Additional Personnel Required by 1965 |
|---|---|---|
| Professional Occupations (Requiring University Degrees) | 8,000 | 7,000 |
| Teachers (not Requiring University Degrees) | 12,000 | 35,000 |
| Sub-Professional & Tech. (non-university) | 5,000 | 4,000 |
| Craftmen & Trades | 29,000 | 11,000 |
| Total | 54,000 | 57,000 |

5. The survey identified nearly 55,000 employees in the high level occupations in 1960. Employers expected that by 1965 an additional 57,000 specialists would be required. There were two factors in addition to economic growth which contributed heavily to this 1965 figure. The first was the introduction of free compulsory primary education which will require 25,000 additional teachers during the five year period. The second was the wastage rate of 25% which was inflated by the large number of expatriate employees holding high level positions in 1960. Doubling the number of high level employees in a five year period presents a formidable problem particularly with the limited number of students available who are qualified for advanced training.

6. Careful analysis of the enrolments of all educational and training institutions indicated that there would be 30,000 students who could be expected to complete programmes of study by 1965 which would qualify them for high level occupations. While this total was unexpectedly high it was still more than 25,000 below the projected needs of the country during the period.

Shortages of this magnitude could seriously curtail Ghana's plans for economic expansion and social development. Since the Government was heavily committed to move forward on its major development plans, methods of overcoming the shortages had to be discovered.

7. In 1961 the Government initiated a Manpower Development Programme which was designed to offset the expected shortages. This was a broadly based national programme with three major divisions each directed at a separate aspect of the entire problem. These three aspects are:

(a) The need to increase the supply of qualified new employees through efforts designed to accelerate and improve the output of students from educational and training institutions.

(b) The need to accelerate the training of persons already employed to equip them for advancement to higher level positions through in-service training, management training and adult education.

(c) The need to increase the productivity (output per worker) of the entire labour force and thereby reduce the number of additional personnel required.

8. This three-part plan was initiated in 1961. Since that time a number of activities have been undertaken which were designed to meet the tri-partite needs of the plan. The brief listing below is presented not as a complete outline of this final operating programme but rather as a report on progress to date.

## Part One
## Increasing the Supply of New Employees

9. Public School System: Review of the entire Ghana educational plan revealed that it might be possible to shorten the total educational cycle appreciably. Under the existing system a student entering Primary School at age six could not complete university before age 25 or 26. The cycle included six years primary, four years middle school, five years secondary, two years sixth form and three years at the university. This twenty year cycle has been restructured to eventually reduce the required time to sixteen years. This saving of four years will, when changes are complete, result in an acceleration of twenty percent in the output of students trained through the post-secondary level.

10. Increased Facilities: Through a series of improvements and enlargements the capacities of the institutions providing pre-university (sixth-form), secondary and university education have been doubled over the past two years.

| Institution | 1960 Annual Student Output | 1965 Annual Student Output |
|---|---|---|
| Secondary Schools | 2,000 | 4,500 |
| Pre-University | 375 | 1,500 |
| University | 500 | 1,200 |

These increases will add significantly to the supply of specialised manpower.

11. Apprentice Training The entire apprentice training programme was re-structured in 1960 and is now in the process of conversion. When these changes have been completed the plan will cover 4,000 apprentices.

12. New University College for Teachers: An entirely new teacher training facility for secondary teachers was opened in 1962. The initial capacity of this institution was 200 and this will be increased as staff and facilities become available. Teachers represent a major share of Ghana's existing shortages.

13. Institute of Public Administration: A new graduate institution for the training of government administrative officers was opened in 1961. The output of the institute is 50 students each year.

14. Statistical Training Centre: This centre was opened in 1961 and provides an intensive one year course for forty students. Graduates are prepared to fill positions as junior statisticians in government and commerical establishments.

15. Educational and Occupational Testing: A team of professional psycholigists has developed and validated a new battery of sixteen aptitude-achievement tests designed to assist in the selection of students with high potential for particular skills or for advanced education. The tests have also been used with considerable success to select candidates for specific occupations and craft training. The tests will be put into wide use during 1963 and it is expected that considerable advantage will be gained from their application.

Part Two

Accelerating the Advancement of Those Now Employed

16. The most critical problem confronting Ghana is the acute shortage of trained and experienced management personnel of all levels. The success of the entire development plan depends on the efficient operation of each new establishment created. Efficient operation, in turn, depends on the wisdom and control exercised by the managers in each enterprise. Improvements in personnel and methods cannot be effected without a strong supervisory and managerial staff capable of carrying through the improvement programmes. Management training and development have, therefore, received major emphasis in the Ghana plan.

17. Management Association: A management association was created two years ago to provide a means of implementing a national programme of management development. The organisation has grown rapidly and plays an important role in the plan. Through the association courses, seminars and conferences have been carried on for the benefit of hundreds of managers and potential managers.

18. Management Training: Courses for beginning, intermediate and advanced managers are regularly presented by the University, the College of Administration and private agencies. A series of four motion pictures on Ghanaian management problems has been produced and has proven extremely successful. Course materials and handbooks have been developed and are in wide use.

19. Instructor Training: The development of additional persons qualified to plan and administer in-service training programmes for public and private establishments has been successfully undertaken. A "Training Directors Association" of 60 men meets regularly and has developed training materials, visual aids and courses of study under the direction of a team of advisers. Courses and intensive study groups for new training directors have been notably successful.

20. Technical Training: Arrangements with the Technical Education Division of the Ministry of Education have made it possible to provide up-grade training for employed artisans on a short-course and "sandwich" basis. These efforts are being expanded. In addition, three new trade schools are planned for 1963 in the industrial areas of the country.

21. Adult Education: The newly created Institute of Public Education has moved aggressively into the task of providing a variety of courses for adults on a part-time and evening basis. Additional training facilities in the commercial occupations have also been provided.

## Part Three
## Increasing the Output Per Worker

22. While all of the efforts listed above have the effect of increasing the productivity of the labour force it was decided that a more direct focus was, nevertheless, required. The Government created the Ghana Productivity Centre in late 1962 and delegated the responsibility for increasing the nation's productivity to this new body. The Centre is still in the organisational stage but is patterned after the examples of similar centres in Israel, India and Western Europe. An initial staff of ten specialists has been recruited and is beginning to attack some of the major problem areas. The Centre is organised to provide research, training and direct consultative advice to establishments in both the public and private sectors. The focal point of the centre is the rendering of advice and assistance to the numerous new state enterprises. Two highly successful conference on productivity have been held and the movement toward increased productivity is well launched and is receiving good acceptance.

23. In the foregoing pages an effort has been made to describe the manpower problems of a new, developing country and to present some of the steps which have been taken to ameliorate those problems. While Ghana is more fortunate than most of the new African countries, its problems do not differ significantly from those in other countries. It is still to soon to be able to make a meaningful evaluation of the effectiveness of the Ghana programme. It is already apparent, however, that those efforts with short-term goals are successful. For example the combined annual output from the Universities will soon reach 1200 students which will enable the country to approximate its needs for 7,000 in the professions by the late sixties. Without planning and controls none of the goals could be attained. Under the programme now operating the major priorities can be met.



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# APPLICATION OF MODERN POPULATION CENSUS TECHNIQUES IN GHANA

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No.102 APPLICATION OF MODERN POPULATION CENSUS TECHNIQUES IN GHANA

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## INTRODUCTION

The 1960 Population Census of Ghana was a clear departure from the customary population counts in Africa. In its objectives, scope, techniques and procedures it can be regarded as a modern Census. In the first place the principles and recommendations of the United Nations and its specialized agencies (like the International Labour Office) were accepted as the basic rules. Modifications were made only in a few cases owing to the need for adaptation to the local, social and physical environment. Moreover, several quite refined techniques concepts and classifications used in statistically well advanced countries were applied for the first time in Africa. The programme of appraisal of the application of these methods is now in progress and only some provisional results will be quoted in this paper.

## 1. THE 1960 POPULATION CENSUS PROGRAMME

### 1.1 The Essential Features of the Main Census

The Census was taken in two phases. In the first phase the "main" Census was taken in a relatively short period of March-April 1960. In this, the six essential elements formulated by the United Nations were strictly adhered to. Four of them considered as the most significant departures from the methods and concepts applied in the past in Ghana and in Africa in general, were:

(a) INDIVIDUAL ENUMERATION: Each person was enumerated and recorded on a separate line of a questionnaire containing 11 items relating to demographic, social and economic characteristics of the population. In the past it was customary, particularly in rural areas, to carry out group enumeration by counting the number of persons, of each sex and in broad age groups, living in a given family, house or even entire village. This system allowed only a limited analysis and eliminated the possibility of callbacks and checks.

(b) SIMULTANEITY: This feature was achieved by relating the whole enumeration to Census Midnight 20 March 1960 and by carrying out the entire enumeration within a maximum of six weeks (three quarters of the population were enumerated within the first fortnight). Census Night, 20th March, was given wide publicity several months ahead and the population, especially heads of houses and literate persons, were asked to remember the Census details of persons who slept in the house on Census Night. Also, country wide celebrations were held on that night (drumming, dancing etc) to impress the importance of Census date upon the minds of the population.

(c) UNIVERSALITY: Every person alive at midnight of 20th March ought to have been counted at the place of stay on that night without distinction of race, nationality, sex or age.

(d) DEFINED TERRITORY: In order to ensure comparability with past and future population censuses and above all in order to decrease to the minimum under-count or over-count, a vast geographic operation preceded the Census

enumeration. The whole country was devided into 6,882 Enumeration Areas (E.A's) of varying size and containing an estimated population ranging from about 700 in rural areas of dispersed settlement to about 1,200 in more densely populated urban areas. The boundaries of the E.A's were plotted on maps and described on special forms to help each enumerator to identify exactly the area he was expected to enumerate. The E.A's are used also for the analysis of the Census information and for many planning and research purposes (e.g. sampling designs).

1.2 The Objectives and Design of the P.E.S.

In the second phase, within less than three months after Census date a Post Enumeration 5% Sample Survey (P.E.S.) was conducted with two main objectives:

(a) To evaluate the reliability of the main Census information namely the accuracy of the count and of the content of replies (i.e. coverage and content errors evaluation). The ultimate purposes are to estimate both these errors and above all to study the extent of success of the methods and procedures adopted in 1960 for the improvement of future enquiries.

(b) To enquire into additional topics which could not be included in the main Census questionnaire e.g. migration, household structure, marriage habits and fertility.

To achieve the above objectives two operations were carried out as part of the P.E.S. project and a third one is at present still in progress:

(I) Re-enumeration of all persons in 5% of Census houses on a special household questionnaire, in which 9 were the items repeated from the main Census and 11 additional topics of enquiry. The sample was a two-stage stratified design with the 6,882 E.A's of the Census constituting the "population" from which the first stage units (868 E.A's) were selected. The 6882 E.A's were first stratified according to their urban, semi-urban, sub-urban or rural nature. Out of the first two categories a systematic selection of 1/5, and out of the latter two, 1/10, of the E.A's was made. The second stage units were the houses and compounds listed in the Census: 1 out of 4 houses (and compounds) in the urban and semi-urban and 1 out of 2 houses (and compounds) in the suburban and rural E.A's were selected systematically. The over-all sampling fraction in both cases was 1/20.

(II) Listing of all houses in 344 E.A's (5% of Census E.A's) to find out houses which were omitted (or enumerated twice) during the main Census. In this case a sub-sample of the first stage units mentioned under (I) was selected in a random-systematic manner.

(III) Reconciliation Checks - Comparisons of information recorded under (I) and (II) above with that in the main Census are being carried out in the office and in the field since the P.E.S. enumeration (June 1960). These should form the main part of the evaluation programme.

The P.E.S. although a part of the Census programme was statistically an independent enquiry. No advance information on the number and characteristics of the population to be covered was given to the interviewers. In operation (I) only the list of addresses of sample houses was given to the interviewer with the instruction to enumerate all persons found in these houses. In operation (II) only E.A. maps were provided.

## 2. EXAMPLES OF CONCEPTS AND TECHNIQUES

### 2.1 The Basic Approach

Among the various concepts preference was given to those which could be clearly and in an unambiguous manner defined. In particular, concepts defined or described by certain physical facts or events were used in preference to those which, although perhaps more refined or more commonly used at the same time also implied a greater risk of misinterpretation or variable interpretation by different enumerators or respondents. In selecting techniques and methods those in respect of which a better control could be achieved were preferred. In most cases concepts, definitions and methods were pre-tested in the field before a final decision on their application was reached. However, it is not claimed that the Census is free of bias and the programme of evaluation intends to cover the various aspects of Census taking without prejudice.

### 2.2 De-facto Population Count

The method of strict de-facto population count was used. The principle that only persons alive in the house and in the locality on Census Midnight should be counted received wide publicity. This principle was in contrast to the deeply rooted social feeling of family and kinship solidarity and concept of "home-town" meaning locality of origin of the family. In past population counts in Ghana and in many other African countries the principle of family affiliation appears to have been mainly adhered to. It can now be assumed that this latter method led in many cases to double counts. At the same time it should be pointed out that the undercounts due to omissions and wilful evasions might have been more considerable.

The de-jure or usual residence concept was not adopted in the 1960 Census because it was likely to be confused with the home-town concept, unless strictly related to length of residence. For ease of enumeration this time element was excluded.

It was considered that the de-facto principle is clearer as it is based on the physical fact of presence on Census Night. If strictly adhered to and in normal periods, namely without extraordinary migratory movements, it should approach very nearly the usual residence concept. It was partly because of this that the Census date in Ghana was chosen in the "dry season" when migration of agricultural labour force is considered at its lowest. The de-facto count should give a more accurate count especially in those African societies where husbands and wives live sometimes separately and where their children sometimes stay with the father, and at other times with the mother, or grandmother or uncle etc.

### 2.3 The Age

(a) THE NOTION OF AGE: In countries where the population is to a considerable extent not provided with birth certificates and where illiteracy is still predominant the notion of age is very vague. Usually the information on age is an estimate of the enumerator or the respondent. Various methods and devices are used to estimate the age of persons and most if not all of them are apt to introduce biases in the age statements. Some of the misstatements which are biased downwards as well as upwards like those caused by the preference of certain digits (0, 5 etc) have been studied by several demographers and methods have been proposed on how to measure and correct them (Whipple, Bachi, Myer and U.N. Secretariat). Others, like those of unmarried women tending to

understate or of young mothers to overstate their age or of older persons to exaggerate their age, are more difficult to correct. There are, also some mis-statements which are less known and take the statistician and demographer by surprize. These are largely connected with the methods adopted for eliciting or estimating the age, e.g. methods which relate age to certain physiological events (teething, puberty, menopause) or personal events (school entrance, marriage) or historical (national and local) events or the facial appearance of the person.

Owing to these difficulties it was customary in past censuses of several countries in Africa and elsewhere not to record the age of a person but, particularly in group enumeration, to count and classify first the population in broad age groups (e.g. children, grown-ups, and elder persons) and subsequently to enter the figures in special columns or cells of the questionnaire. This method had the only advantage of concealing the errors. On the other hand, several disadvantages, mainly that of not allowing for any study of age mis-statements and their correction, were inherent in the system and the data on age as such were of little if any use for demographic analysis.

(b) METHODS OF AGE ESTIMATION IN THE GHANA CENSUS: In the Ghana Census it was decided to make a serious attempt to elicit the age of the population in single years of age as accurately as possible in the given conditions. The results of the First Field Test[1] conducted in the preparatory period of the Census indicated that the notion of age is quite reasonable in certain classes of the population and that the methods tested proved quite helpful.

It was, therefore, decided to spread the notion of age to the entire population. In the Census education campaign through radio, newspapers, talks etc the topic of age was one of the most publicised Census items. In lesson notes to teachers the latter were asked to elicit the age of the school children and by this way also to assist in estimating the age of their parents. Chiefs and elders in rural areas were asked to refresh the memory of their people on national and local events.

In the Enumerator's Manual the methods to be used were exemplified and the following order of preferences was suggested: certificates (of birth, baptism, etc); historical-national events the list of which was given in the same manual; local events; method of relating the age to certain personal or family events (e.g. age of children to that of parents); other methods, like facial appearance.

2.4 Regular School Attendance

For the sake of brevity of the main Census questionnaire items only one question - either on literacy or on the level of education - could be included. The question on literacy, defined conventionally by the knowledge to read and write was excluded because its interpretation was likely to vary considerably. Instead, actual attendance at regular schools, type of school and grade attained were enquired into in order to ascertain the level of education. This method was considered more appropriate despite the fact that it may not cover the whole literate population. Some people may acquire education outside the regular school while others although having attended a primary school might nevertheless not be literate.

The question on literacy was included in the P.E.S. where a higher quality of interview and a more uniform interpretation was expected. Its main aim is to serve as a measure of appraisal of the Census information on school attendance. The results might suggest the extent to which the above assumption was right.

1. B. Gil, 1960 Population Census of Ghana, Report on the First Field Test, Government Statistician's Office, Accra, December 1959.

2.5 Economic Activity in a Reference Period

For the description of the economic characteristics of the population the labour force concept with some modification was adopted. Those who worked during the month preceding the Census date for even one day only or for a few hours daily were regarded as "employed". The essential modication of the concept consisted in the consideration of all "job holders" as employed. This means that even those who did not work in the reference month but had a job from which they were temporarily absent (e.g. farmers in off-season, workers on leave, temporary lay-off and similar categories of workers) were included among the employed category. Adding to the number of these employed persons those who stated to be completely unemployed (but looking for a job) during the reference month we obtain the total economically active population. The interpretation of the data is facilitated by the distribution of the population aged 15 years and over by type of activity, sex and age (Fig. III), and of the employed persons by industry and occupation (Fig. IV). It appears for example, that the labour participation rate of the female population is relatively high, especially in the age groups 40 to 64. At the same time the majority of the female workers are engaged in agriculture - 58% (17% being family workers) and 28% in petty trading which is very often a part-time work only. These are very important points to consider in the analysis of the present economic structure and of the expected changes in a developping economy (e.g. intensification of market economy, industrialisation and general educational and technological advancement).

## 3. APPRAISAL OF SOME RESULTS

3.1 The evaluation project is, at the time of writing this paper, only in its initial stages as first priority is being given to the processing and publication of the Census information. However, some provisional results of evaluation obtained by rather rudimentary methods and simple counts might be of some interest.

3.2 Summary of Census and P.E.S. Discrepancies

The main part of the content error evaluation consists in a comparison between the information recorded for each single person in the P.E.S. This means that only persons whose names in the main Census could be matched with those in the P.E.S. are included. For reasons of economy a sub-sample of about 7% of the P.E.S. E.A's (0.5% of total population) is being examined intensively.

It was mentioned that the P.E.S. information was intended to give a measure of the main Census errors. It is normally assumed that a sample enquiry with a more qualified field staff is more reliable than a large scale Census. At this stage it cannot be stated to what extent this applies to Ghana, particularly in view of the fact that in certain cases the contrary appears to be true. At present one can only give a provisional measure of the discrepancies between Census and P.E.S. data.

The results of the comparison between Census and P.E.S. replies, person by person and item by item, were classified according to the "severity" of the discrepancy using a somewhat arbitrary classification of four grades: 0, I, II, and III. For example, in the case of age the respective discrepancies were: 0 (no discrepancy), 1 to 4 years, 5 to 9 years, 10 or more years, irrespective of sign (see Table 1).

On the whole, if we consider the largest percentage of identical replies as reflecting the degree of reliability of Census and P.E.S. data, then the most reliable would be the replies on tribe (98% identical), education

(88%) and somewhat less reliable the replies on type of activity (80%) and birthplace (70%). The most affected by discrepancies and consequently the least reliable is age.

With respect to economic activity a discrepancy does not necessarily mean that one of the replies (Census or P.E.S.) is wrong. The difference may be partly due to a true change in activity between the dry season of the main Census and the rainy season of the P.E.S. period. Also a non-response in one of the above enquiries was considered as a severe discrepancy. This latter classification may be correct with respect to the appraisal of the work of the enumerator but not necessarily of the statistical data, if the non-response happened to be proportionately distributed.[1]

In the case of age only a small proportion of grade (I) discrepancy could be due to a true change i.e. to the aging of the population between Census and P.E.S. The rest and largest part of the discrepancy is a definite proof that one, at least, of the replies was wrong. Here again the discrepancies may not affect the statistical data in all respects. For example, in the analysis of the relationship between age and other demographic and economic characteristics, the age distortions may affect the results significantly. On the other hand, in the consideration of the mere age structure their effects may be less apparent (see below).

3.3 Census and P.E.S. Age Comparison

With respect to the age distribution some additional measures have been obtained. A detailed comparison of age statements given in Census with those in P.E.S. has been made in a sub-sample of 52 E.A's for persons aged 15 years and over who could be matched (see Table 2). The discrepancies, as expected increase with advancing age. Also, in younger ages (15-34) the "net" discrepancy gives a higher age in P.E.S. than in Census; the total percentage of those stating a higher age in P.E.S. is larger than the percentage stating a lower age. In the older ages (35+) the "net" discrepancy shows a lower age in P.E.S. On the whole, it appears that the "plus" discrepancies offset the "minus" ones to a large extent. Comparing the percentage age distribution of the matched persons obtained from the main Census with that from the P.E.S. (Table 2, last two columns) one does not find considerable and clear shifts in the distribution. The existing ones, however, should not be minimized and more information has to be gathered for a better appraisal.

The results of comparison of age and birthplace information in Census and P.E.S. may throw some light on the observed percentage age distribution by sex shown in Fig. I. This age structure is partly affected by the peculiar sex and age structure of the immigrants (foreign born) and their descendants born in Ghana (foreign origin born in Ghana). But partly, the age distortions affect also the population of Ghana origin. Abnormally high percentages are found among males in age groups 25-29 and among females in age groups 20-24 and 25-29 (Table 6).

The following are the main possible explanations, listed not necessarily in order of importance:

(a) Age mis-statements, mentioned above.

(b) Mis-statements in origin and birth information. Table 1 shows a discrepancy (Grade III) in respect of country of birth between Census and P.E.S. of 5%. This may not be the exact measure of mis-statements, and should not necessarily be taken as a proof that foreign born or persons of foreign origin born in Ghana stated in the Census that they were born in Ghana or that they were of Ghanaian origin, respectively. But it shows definitely that some mis-statements were made either in Census or in P.E.S.

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1. In fact in the P.E.S. evaluation study of the 1950 Censuses of Population and Housing of the United States, the census "non-reported" figure was distributed among the P.E.S. categories proportionately to the distribution of the weighted P.E.S. sample results.

(c) Emigration of persons of Ghana origin. Their number, sex and age structure are not known. The 1960 Census counted some 25,000 Ghanaians who were born abroad but resided in Ghana at the time of the 1960 Census. The number of Ghanaians who are still abroad is not known; it may not be considerable but on other hand, also not insignificant.

(d) Fluctuations in fertility and mortality in the past.

3.4 Other Measures of Age Accuracy

On the whole the age information obtained in the 1960 Census compares favourably with data of other African and some selected Asian countries. The index measuring the preferences for certain digits (e.g. 0, 5, 8) in age reporting (Myer's Index, Table 4) puts Ghana third in rank among the selected countries. The sex and age ratio scores and the joint index for Ghana total population and particularly for persons of Ghana origin (eliminating influence of immigration on the age of structure) rank fourth with respect to general quality of age data (Table 5). It appears also that by a simple graduation the 5-year age distribution of persons of Ghana origin becomes smoother and approaches the expected one (Table 6). Further and more refined adjustments could be carried out after additional information has been obtained on the causes and extent of mis-statements and distortions.

TABLE 1 - SUMMARY OF DISCREPANCIES BETWEEN CENSUS AND P.E.S. BY ITEM AND GRADE - Percentages

| Grade of discrepancy | Age | Birth place | Tribe | Level of education | Type of activity | Definition of discrepancy grades | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Age difference in years: | Birth place difference between: | Tribe difference between: | Education - difference in attendance of: | Type of activity differences like: |
| Total | 100 | 100 | 100 | 100 | 100 | | | | | |
| 0 | 24 | 78 | 92 | 88 | 80 | No discrepancy between Census and P.E.S. | | | | |
| I | 39 | 14 | 1 | 4 | 1 | 1 - 4 | Localities | Sub-groups | Grades | Employed Yes/No |
| II | 20 | 3 | 2 | 1 | | 5 - 9 | Regions | Groups | Types of school | |
| III | 17 | 5 | 5 | 7 | 19 | 10 + | Countries | Major groups | Attended: Yes/No | Econ. act: Yes/No |

TABLE 2 - COMPARISON OF CENSUS AND P.E.S. ENTRIES ON AGE - Percentage of persons reporting in P.E.S. an identical, higher, or lower age than in main Census.

| Age in census | Total | Identical | P.E.S. higher by ..... years | | | | P.E.S. lower by.....years | | | | Age Distribution of matched persons | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | 1 | 2-4 | 5 + | Total | 1 | 2-4 | 5 + | Census | P.E.S. |
| Total 15 and over | 100.0 | 23.6 | 36.0 | 6.8 | 11.5 | 17.7 | 40.4 | 6.4 | 13.3 | 20.7 | 100.0 | 100.0 |
| 15 - 19 | 100.0 | 35.4 | 44.8 | 16.1 | 17.7 | 11.0 | 19.8 | 10.7 | 9.1 | 0.0 | / 8.3 | / 8.2 |
| 20 - 24 | 100.0 | 29.8 | 42.3 | 11.4 | 16.1 | 14.8 | 27.9 | 7.7 | 15.7 | 4.5 | / 12.2 | / 12.9 |
| 25 - 34 | 100.0 | 23.0 | 40.3 | 7.4 | 13.3 | 19.6 | 36.7 | 7.4 | 17.4 | 11.9 | 27.1 | 27.4 |
| 35 - 44 | 100.0 | 22.7 | 31.4 | 3.6 | 8.4 | 19.4 | 45.9 | 5.8 | 13.7 | 26.4 | 20.3 | 19.7 |
| 45 - 54 | 100.0 | 22.0 | 32.3 | 5.1 | 7.2 | 20.0 | 45.7 | 4.0 | 11.6 | 30.1 | 14.5 | 13.8 |
| 55 - 64 | 100.0 | 19.1 | 33.7 | 3.6 | 11.6 | 18.5 | 47.2 | 5.4 | 9.3 | 32.5 | 8.8 | 9.3 |
| 65+ | 100.0 | 15.0 | 25.1 | 3.6 | 7.8 | 13.7 | 59.9 | 3.9 | 7.2 | 48.8 | 8.8 | 8.4 |

1. In this first and incomplete matching the percentage age distribution of matched persons is different from the one obtained from the tabulation of the total population in Census or in the 5% P.E.S. sample. Particularly small appear to be the percentages in ages 15-24. The results of this table might somewhat change with more complete matching.

TABLE 3 - INDICES OF PREFERENCES (+) OR DISLIKES (-) FOR VARIOUS DIGITS IN AGE REPORTING, GHANA POPULATION CENSUS 1960[1]

| | Sex | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Index (total) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percent of total "blended" population | M | 20.8 | 6.3 | 10.0 | 6.5 | 7.9 | 13.6 | 9.4 | 6.9 | 11.0 | 7.6 | |
| | F | 21.8 | 6.4 | 10.0 | 6.3 | 8.0 | 13.0 | 4.4 | 6.3 | 11.4 | 7.4 | |
| Deviation (±) from the expected 10% | M | +10.8 | -3.7 | - | -3.5 | -2.1 | +3.6 | -0.6 | -3.1 | +1.0 | -2.4 | 30.8 |
| | F | +11.8 | -3.6 | - | -3.7 | -2.0 | -3.0 | -0.6 | -3.7 | -1.4 | +2.6 | 32.4 |

1. Calculated according to Myer's formula shown in U.N. Population Studies No. 23 (ST/SOA/Series A) for the 10% sample data given in the Advance report of Volumes III and IV, Census Office, Accra, 1962.

TABLE 4 - INDEX OF DIGIT PREFERENCES (AND DISLIKES) IN AGE REPORTING IN CENSUSES OF SELECTED COUNTRIES[1]

| Sex | Ghana | Portuguese Guinea | Union of South Africa (total population) | Algeria Moslems | Egypt | Cyprus | Turkey | Ceylon |
|---|---|---|---|---|---|---|---|---|
| | 1960 | 1950 | 1946 | 1948 | 1947 | 1946 | 1945 | 1946 |
| Males | 30.8 | 52.1 | 33.2 | 23.3 | 91.7 | 28.9 | 39.8 | 26.4 |
| Females | 32.4 | 39.8 | 32.3 | 33.9 | 101.0 | 43.2 | 81.1 | 29.5 |

1. Calculated according to Myer's formula for data given in the U.N. Demographic Years Book (1955). This index may range between "0" (no preferences or dislikes for special digits) and 180, the theoretical maximum. Divided by "2" the index shows the percentage of persons reporting ages with inaccurate terminal digits (see R. Bachi, Measurement of the tendency to round off age returns, XXVIII session of the I.S.I. Rome 1954).

TABLE 5 - COMPOSITE INDEX OF INACCURACY OF AGE AND SEX DATA IN CENSUSES OF SELECTED COUNTRIES[1]

| Ratio score | Ghana 1960 | | Portuguese | Union of South Africa (total population) | Algeria Moslems | Egypt | Cyprus | Turkey | Ceylon |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Ghana origin only | 1950 | 1946 | 1948 | 1947 | 1946 | 1945 | 1946 |
| Sex | 8.2 | 7.3 | 16.3 | 8.6 | 6.3 | 7.1 | 3.4 | 12.1 | 9.6 |
| Age-males | 11.6 | 9.6 | 12.3 | 5.9 | 6.8 | 24.3 | 4.4 | 13.6 | 12.2 |
| -females | 16.0 | 12.2 | 18.5 | 6.9 | 6.6 | 28.3 | 5.1 | 30.6 | 11.3 |
| Joint score (weighted) | 52.2 | 43.7 | 79.7 | 38.6 | 32.3 | 73.9 | 19.7 | 80.5 | 52.3 |

1. Calculated according to the United Nations Secretariat method explained in U.N. Population Studies No. 23.

TABLE 6 - PERSONS OF GHANA ORIGIN BORN IN GHANA BY SEX AND AGE
Observed and graduated five-year percentage distribution[1]

| | Sex | All Ages | 0-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65 and over |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Observed | M | 100.0 | 19.7 | 16.0 | 11.2 | 8.4 | 7.7 | 7.6 | 6.6 | 5.2 | 4.5 | 3.4 | 2.8 | 1.7 | 1.9 | 3.3 |
| | F | 100.0 | 19.7 | 15.3 | 9.9 | 7.9 | 9.4 | 9.0 | 7.2 | 5.2 | 4.4 | 2.9 | 2.6 | 1.6 | 1.7 | 3.2 |
| Graduated | M | 100.0 | 18.0 | 15.5 | 12.0 | 9.3 | 8.0 | 7.3 | 6.4 | 5.4 | 4.5 | 3.6 | 2.7 | 2.1 | 1.7 | 3.5 |
| | F | 100.0 | 17.7 | 14.9 | 11.4 | 9.3 | 8.8 | 8.3 | 7.1 | 5.6 | 4.3 | 3.3 | 2.5 | 1.8 | 1.6 | 3.4 |

1. Calculated according to a modified form of the formula quoted in Population Studies, No. 23. The modified formula uses three 5-year age groups, instead of five, in the following form: $\frac{5}{24}a + \frac{1}{2}b + \frac{5}{24}c$.

FIG. 1 - POPULATION BY SEX, AGE AND ORIGIN

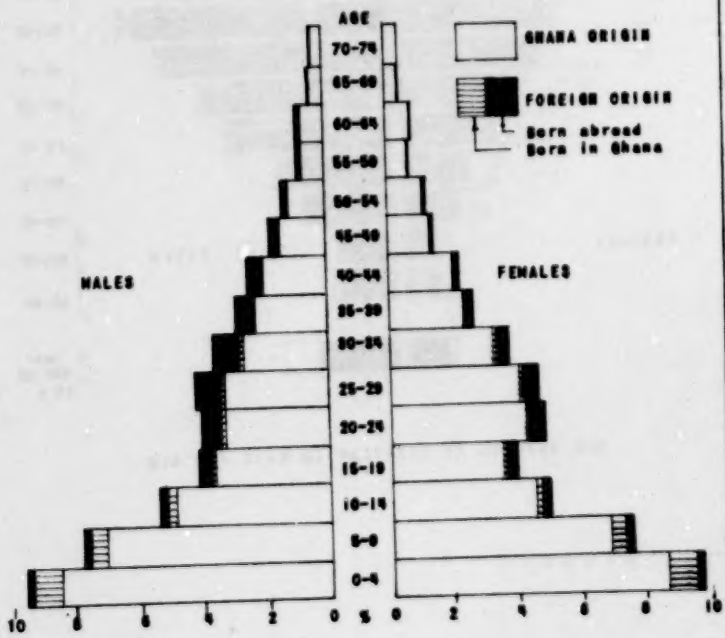



FIG. 2 - SCHOOL ATTENDANCE BY SEX AND AGE

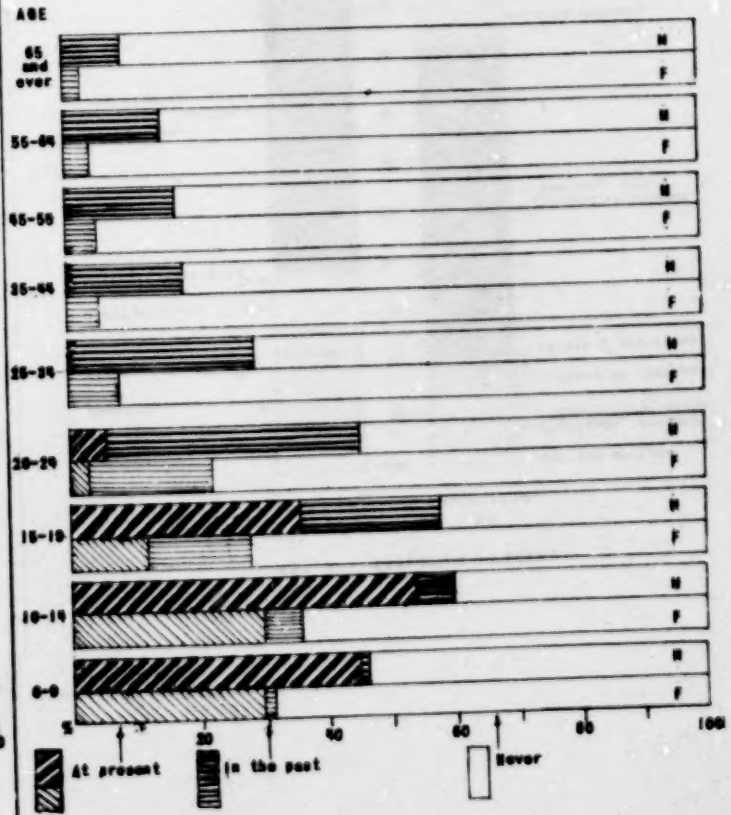


FIG. 2 - TYPE OF ACTIVITY BY SEX AND AGE

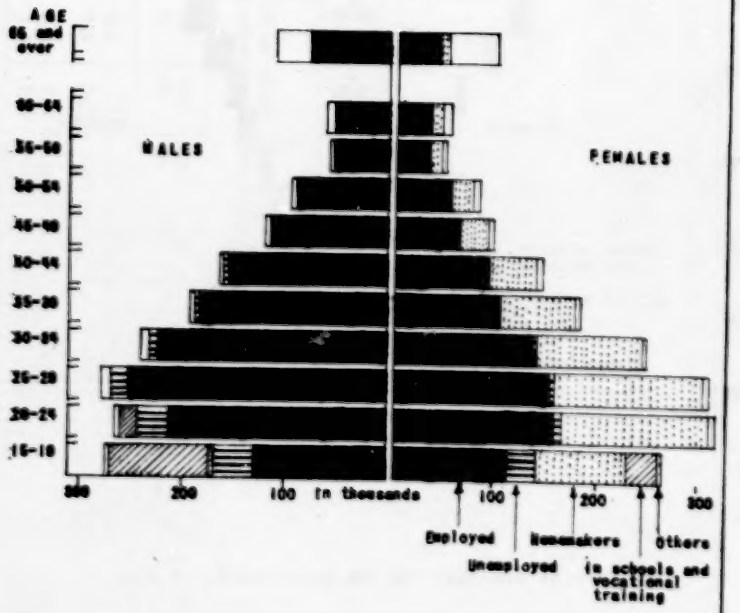
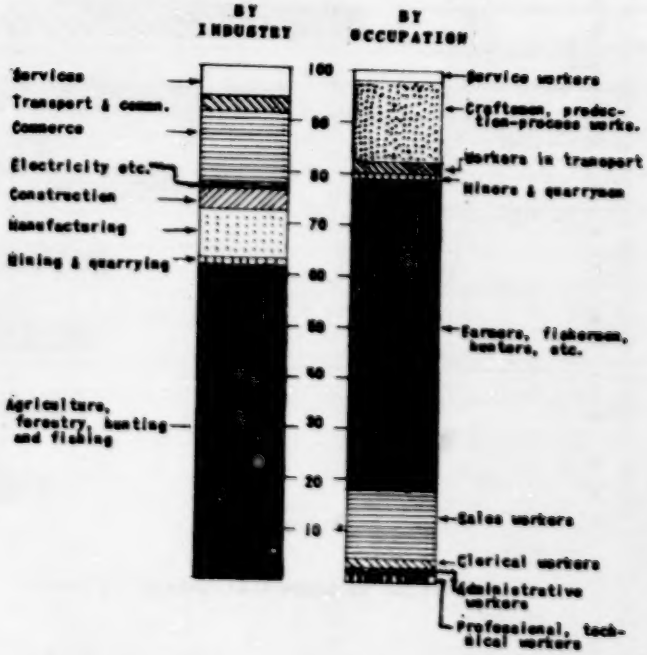



FIG. 1 - EMPLOYED PERSONS



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UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

Agenda Item: B. 2. 1

Nigeria

# TECHNIQUES OF MANPOWER ASSESSMENT

By Charles W. BUNKER

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

## NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

# TECHNIQUES OF MANPOWER ASSESSMENT

by

Charles W. Bunker

## INTRODUCTION

The accelerated growth of the national economies in under-developed countries constitute the basic objective of government policy as a strategic means of attaining higher standards of living and adequate distribution of the national income for their peoples.

Consequently, most of these governments are engaged, to a greater or lesser degree, in formulating an economic policy whose rational function is the drawing up of development plans.

Economic development planners whose direct aim is to draw up plans for accelerated economic growth must of necessity analyse the economic and social factors involved. Early examination of the problems involved would probably establish that among the economic pre-conditions for accelerated growth are:-

(a) the existence of a certain rate of savings in order to increase capital;

(b) the increase of factors of production, for example, utilisation of idle manpower, the raising of productivity and the rate of training, increased mechanisation;

(c) planning in the sense of setting goals, of economic development, and the creation of receptivity to change; and

(d) disciplining and increasing command by government to influence the economy.

It will be seen that a number of important problems related to the utilisation of human resources must be examined as an essential element in any national economic development plan. This is generally referred to as Manpower Planning. The basic problem of harnessing human resources consists generally of two important aspects:-

(a) the efficient utilisation of labour with a view to maximising the national output and

(b) the elimination of waste in the form of unemployment and under-employment.

## PRACTICAL APPROACH

It is not the intention of this paper to enter into a discussion of the merits of orthodox economic theory versus the sociological-psychological approach to the utilisation of human resources but to indicate some practical methods by which machinery can be created to assist manpower planners to obtain basic information on the existing manpower utilisation and thereafter, regular employment situation reports.

Most modernising countries find themselves entering into the developing phase without the necessary institutions for assessing the existing utilisation of their human resources. Some have accepted the advice of international economists who advocate what has been described as impressionistic manpower forecasting. Such forecasting may well meet the situation in some countries but may be highly misleading in others. The only reliable method appears to be pragmatic.

This consists of continuous periodical surveys, the analysis of which, should provide information for adjustment in the implementation of development schemes. The extrapolation based on past and present experience should provide a reliable method of forecasting manpower requirements. It may be argued that the demand for certain skilled personnel like doctors, teachers etc. would prove the exceptions, but it is certain that in the long run the estimation of the demand for these can also be based on trends.

## MANPOWER BOARDS

It is clear that modernising countries must set up a central manpower planning body. Since manpower problems are the concern of many ministries, the programme of human resources development should be implemented by an inter-ministerial board. In addition to members of the government, this board should normally have representation from the non-government employing institutions and organised labour. The Economic Development Ministry should, of course, co-ordinate the work of all ministries involved with the labour force as a whole and these would most certainly include the Ministries of Agriculture, Labour, Education, Commerce & Industry.

This co-ordination, in view of its importance, must be conducted at the highest possible level. It should take the form of a Manpower Board consisting of the ministers responsible for the departments concerned together with the central economic ministry and reporting direct to the Prime Minister. In Federated States it is important to integrate regional ministries where they have autonomous authority in any of the functions particularly in those of agriculture and education.

The purpose of the Board should be to make the assessment of human resources through periodical manpower analysis and to integrate the results within the overall development plans. The Board should deal with co-ordinating the education expansion with the needs of the industrial and commercial departments, expansion of the civil service, utilisation of external aid in the projected development plans.

It is essential that the Board should be served by a manpower Secretariat set up within the central economic ministry. If high-level personnel are not available in the country concerned external aid should be sought to man the key positions in the Secretariat. Experts should be sought to give advice on such varied subjects such as manpower projection, supply and demand, employment opportunities and for dealing with social problems connected with high capital intensity versus labour intensity.

## MANPOWER SECRETARIATS

The importance of a Manpower Secretariat in integrating the work of sub-committees such as that on professional and technical education and even of primary education is evident if full utilisation of the human resources is to be realised. The importance also of agriculture to the majority of developing or modernising countries must not be overlooked. Indeed the human resources to be deployed in the agricultural sphere is of paramount importance and the development of agriculture must play a predominant role in the majority of manpower development plans. As has already been said the personnel for the Manpower Secretariat must be of the highest calibre and must serve the Board by producing co-ordinated plans for manpower development. It must carry out regular manpower surveys; maintain professional manpower registers; indicate the shortage of strategic skills, forecast the availability of specialist workers for new enterprises; indicate, where the need arises, for accelerated or emergency training schemes and where possible dictate educational needs compatible with financial ability to meet them.

## POST-ENUMERATION SURVEYS

In many of the developing territories basic labour force data is either non-existent or sketchy and in the absence of basic census data on economic activity some form of sample surveys would need to be undertaken early to gauge the existing employment situation. It is not always possible to obtain the necessary statistics from a national census nor even is it desirable as it further complicates the enumerator's task in what is basically a demographic exercise. Basic information on the labour force may, however, be obtained by utilising a percentage of the already trained enumeration staff to carry out what may be called a Post-Enumeration Survey into economic activity immediately, or as soon as possible, after the census.

A suggested way of organising such a post-enumeration survey on a sample basis would be to select a number of persons at random within each supervision area into which census districts are usually divided. The number of persons selected would, of course, have to be decided in accordance with normal sampling principles, but it is recommended that the sample selected should be approximately twice as large in urban areas as in rural areas to ensure that the sample was well stratified. The use of sampling has the advantage that since a smaller number of people have to be interviewed more time can be devoted to each interview and the most highly qualified enumerators or perhaps only the supervisors need be employed to carry out the survey.

## EMPLOYMENT MARKET INFORMATION PROGRAMMES

Post-Enumeration Surveys, conducted decennially, can be augmented during the intervening periods through the medium of an Employment Market Information Programme which should be developed, preferably by the Ministry of Labour. The programme is directed towards obtaining information from existing employing establishments on the current level of employment and through the use of carefully designed questionnaires an evaluation of short-term projection of future requirements in the salary and wage-earning sphere. Such a programme could consist of either taking a complete count by way of circulating a questionnaire to all employers on a master register or by a sampling method conducted every six months. Government establishments can be ignored except in so far as it is necessary to enquire what posts listed in the Annual Estimates are vacant at the time of the enquiry.

The Ministry of Labour is probably best qualified generally to handle these enquiries if it is well represented throughout the territory. It requires the establishment of an Employment Market Information Unit within the Ministry which would act as an agent of the Manpower Secretariat.

Enquiries conducted by post have a serious disadvantage arising from illiteracy. In nearly every modernising country this is a major difficulty whatever the language employed in the questionnaires. It is thus necessary to have a field organisation to follow up and assist employers to complete the questionnaires and arrange a system for checking off receipts of completed questionnaires. A simple way of doing this is for the Unit to send copies of the master list of all employers in their areas to district Labour Officers. The employers concerned are requested to forward completed questionnaires to that officer. The Labour Officer is then required to check off on his list returns as received and to visit such employers who have not replied by a given date and for him to offer assistance in completing the form.

The questionnaires should be designed so as to obtain information on the following matters: total

number of employed indicating the number separately of non-indigenous workers; separate data on the employment of women; what vacancies exist; information on the difficulties experienced in filling these vacancies; shortage of skills; whether the employer is making any attempts by apprenticeships or in-service training to bridge this gap. The questionnaire also should ask employers for a projection as to the level of employment in the undertaking six months ahead. Questions are also asked regarding the ability of the establishment to expand and, if expansion is desired, why it cannot be proceeded with. For instance, there may well be difficulties in communications, utility services, shortages of raw materials, in effects of financial regulations - export and import tariffs etc.; information is also sought on distribution difficulties and level of demand for the employers' products. In examining the vacancies notified by government departments difficulties in the recruitment of staff through shortage of skills is noted. Employment Service statistics are, of course, incorporated into the Employment Market Information Report.

## THE AGRICULTURAL AND ENTREPRENEURAL SECTORS

Master lists of employers in a number of countries, particularly in Africa, are usually incomplete in two major sectors and special arrangements must be put in hand to deal with these. The first concerns small entrepreneural undertakings which are not normally visited by the Labour Inspectorate due to the inadequacy of staff to cover this field. This is an important omission. In one country in Africa it has been estimated that employment figures for these small undertakings equal, if not exceed, that calculated representing the salary and wage-earning labour force employed in undertakings employing ten or more workers.

The second concerns the agricultural field. In the smaller countries with a well developed plantation industry, agricultural undertakings can be incorporated in the Employment Market Enquiry in the way described but in a number of modernising countries, again particularly in Africa, agriculture takes the form either of small-holdings or subsistence farming. Little or nothing is generally known of the employment situation or potential in this enormous field.

Basic employment information can, of course, be obtained by the Post-Enumeration Survey on these sectors but the regular periodical follow-up required a different technique. The supervising agency conducting the periodical enquiries can still be the Employment Market Information Unit of the Ministry of Labour and a modified type of questionnaire can be employed. It is important to assess in agriculture the extent of family employment, crop sharing reward systems, seasonal employment and normal full-time wage-earning employment.

It is also necessary to obtain information on tenancy conditions, communial ownership systems and other factors which may have a bearing on the potential utilisation of the labour force.

A suggested method of organisation for conducting the necessary enquiries is through the employment of part-time officials, preferably school teachers during school vacations, appointed on a 'permanent' basis as a correspondent for a given area such as a province or other geographical or political division in the case of agriculture, or for a political ward or other suitable division in a town or city. These areas or divisions could be divided into three sections to be visited by the correspondent in turn each school vacation. Thus in the year each of the farms or small undertakings can be visited. Every second six-monthly Employment Market Information Report should therefore contain data on the employment situation in these sectors. It is suggested that the correspondents' work would be supervised by the district labour officer but some countries may well wish to organise the operation in so far as agriculture is concerned through the Ministry of Agriculture or even the Provincial or District Administration.

## OCCUPATIONAL CLASSIFICATIONS

The importance of a National Classification of Occupations to modernising countries cannot be too highly stressed. For a post-enumeration survey an occupational coding system must be available or one devised as a matter of urgency. This can take the form of merely identifying the occupations followed in the country concerned and arranging them into a coding index by 3-digit unit groups. If no National Classification of Occupations has been devised a recourse to the *International Standard Classification of Occupations at Unit Group level would provide a useful guide.

A National Classification of Occupations must, however, be devised giving a detailed statement of the work performed and materials and tools used by persons following the occupations listed in an expanded 5-digit Classification. This is an essential element in a successful Employment Market Information Programme. The advantage in making available a National Classification of Occupations to the employment service is obvious.

## STATISTICAL COMMITTEES

The importance of a Standing Committee on Statistics cannot be over-emphasised. Many departments of government institute statistical enquiries and it is not uncommon for questionnaires bearing requests for similar information being issued simultaneously or within a short period. It is essential therefore that a National Standing Committee should be set up,

*International Labour Office, Geneva, 1958.

preferably under the aegis of the Central Economic Planning Ministry, to co-ordinate statistical enquiries. For example, Ministries of Economic Development or Commerce and Industry may well have information on the projected establishment of new industries or the expansion of the existing industries which is not available to, for instance, Ministries of Labour engaged in making Employment Market Surveys and the Ministries of Education may well possess information on the general education picture which needs to be co-ordinated with manpower projections. All this information must find its way to the Manpower Secretariat where an up-to-date picture of the current utilisation of manpower is available and projections can be made for the future.

It is advisable, if for some reason a Standing Committee on Statistics is not established, to ensure that no major statistical enquiry is undertaken by any ministry without the approval of the central planning authority, and that any enquiry touching the human resources field should be initiated only by the Manpower Secretariat.

## CONCLUSION

Techniques of manpower assessment will vary according to many factors among which are problems of communications, sizes of countries, and to a lesser extent sizes of population but as has been suggested above modernising countries following systems based on continuous periodical surveys will best serve the central economic authority in their duty to provide for their peoples a pre-determined minimum standard of well-being which is the basic objective of manpower planning.

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France

# LES APPORTS DE LA PSYCHOLOGIE APPLIQUEE DANS LE DOMAINE DU TRAVAIL, AUX ETAPES ACTUELLES DU DEVELOPPEMENT SOCIO-ECONOMIQUE DES ETATS D'AFRIQUE

Par le Médecin-Colonel LATOUCHE

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Experts en psychologie du Travail
au Ministère de la Coopération,
Paris

Les mémoires rédigés à l'intention de la Conférence des Nations Unies sur l'application de la science et de la technique dans l'intérêt des régions peu développées sont des documents de travail. Ils sont publiés tels qu'ils ont été présentés et les assertions et opinions qu'ils contiennent sont celles de leurs auteurs.

## NOTES

1. Les mémoires choisis pour être présentés en séance générale pourront être obtenus à la Conférence dans les langues officielles suivantes des Nations Unies: anglais, espagnol, français et russe.

2. Les mémoires choisis pour être présentés en séance spéciale pourront être obtenus à la Conférence dans l'une seulement de ces langues officielles.

3. Les résumés qui ont été rédigés pour tous les mémoires par les auteurs de ceux-ci pourront être obtenus à la Conférence dans les langues officielles suivantes des Nations Unies: anglais, espagnol, français et russe.

4. Préalablement à la Conférence, les mémoires et les résumés ne feront pas l'objet d'une distribution générale mais d'un tirage restreint destiné aux délégations des gouvernements et autres participants officiels. La publication et la distribution générale des actes de la Conférence s'effectueront conformément aux règles et pratiques agréées par le Comité des publications des Nations Unies.

# LES APPORTS DE LA PSYCHOLOGIE APPLIQUEE DANS LE DOMAINE DU TRAVAIL, AUX ETAPES ACTUELLES DU DEVELOPPEMENT SOCIO-ECONOMIQUE DES ETATS D'AFRIQUE

par le Médecin-Colonel LATOUCHE
et Madame G. DORMEAU

Experts en psychologie du Travail
au Ministère de la Coopération - Paris.

Seuls des critères sociologiques et psychotechniques permettent de discerner dans une population aussi hétérogène, les éléments les plus capables de bénéficier d'une formation professionnelle et de s'intégrer rapidement de façon stable dans le monde du travail. Les critères de réussite scolaire se sont montrés par contre constamment en défaut.

Sans doute s'étonnera-t-on de la marge d'incertitude des pourcentages cités ci-dessus : dans l'Afrique nouvelle, il est en effet, à l'heure actuelle, impossible de donner des conclusions stables en matière de psychologie sociale. On voit les phénomènes humains évoluer avec une rapidité inconnue jusqu'ici dans le reste du monde ; et dans l'effervescence générale, il est difficile d'isoler les divers facteurs qui conditionnent le processus évolutif pour élaborer en temps voulu une solution rationnelle généralisable sans qu'elle ne soit déjà dépassée. Ces transformations humaines se sont effectuées dans la dernière décade avec une telle rapidité que toutes les phases transitoires sont encore observables dans la plupart des Etats. Ceci permet de concevoir l'hétérogénéité des milieux du travail où se cotoient citadins instruits et paysans encore très frustres Encore au Congo-Brazzaville se trouve-t-on aujourd'hui devant une population particulièrement prête à être formée. On sait trop peu en effet que c'est un des Etats d'Afrique le plus largement scolarisé au cours de la dernière décade, tant dans les milieux ruraux que dans les milieux urbains ; même dans la génération trop âgée pour avoir bénéficié de l'extension de la scolarisation, la connaissance du français en tant que langue de grande diffusion facilite immédiatement l'adaptation au travail. La situation est identique dans la République du Gabon. Le problème est plus ardu dans des Etats où l'extension de la scolarisation rurale est à ses débuts, surtout si aucune langue principale n'est commune à la majorité des illettrés.

Pour illustrer la rapidité de transformation des milieux humains en Afrique nous donnons ci-dessous, pour les années 1950 à 1960, l'évolution des moyennes des résultats à un même test d'adaptabilité générale" de plusieurs centaines de jeunes adultes de 17 à 22 ans, ayant effectué une scolarité primaire banale et vivant dans deux capitales (capitales A et B) de deux Etats voisins, comparables quant aux facteurs ethnologiques, climatiques et géographiques. L'Etat "A" dans son histoire a bénéficié d'une légère avance, au point de vue économique et social ; ses taux d'urbanisation et de scolarisation sont nettement plus élevés. Précisons que dans des villes de pays anciennement industrialisé une expérience identique ne montrerait pas de différence appréciable des moyennes à 10 ans d'intervalle.

| Capitale A | | Capitale B | |
|---|---|---|---|
| Taux de scolarité passant entre 1950 et 1960 de 50 % à 80 % environ. | | Taux de scolarité passant entre 1950 et 1960 de 20 % à 40 % environ. | |
| Années | Note moyenne à un test d'adaptabilité générale | Années | Note moyenne à un test d'adaptabilité générale |
| 1950 | 19,74 | 1951 | 16,91 |
| 1951 | 22,61 | 1952 | 18,89 |
| 1952 | 22,95 | 1953 | 20,64 |
| 1953 | 23,11 | 1954 | 21,28 |
| 1954 | 24,25 | 1955 | 21,44 |
| 1955 | 25,85 | 1957 | 23,13 |
| 1956 | 26,50 | 1958 | 24,67 |
| 1957 | 27,70 | 1959 | 25,16 |
| 1958 | 27,81 | | |
| 1960 | 28,11 | | |

Ces résultats sont ceux du test "Progressive Matrices 1938" de RAVEN administré collectivement en 25 minutes suivant une technique toujours identique.

La progression année par année des résultats moyens dans chaque Capitale est frappante : en dix ans d'expérimentation chaque groupe augmente son score moyen de 8 à 9 points, ce qui pour le test considéré dénote une élévation étonnante des capacités mises en jeu.

Qu'il s'agisse soit d'un développement progressif d'aptitudes latentes soit plutôt de l'exercice plus précoce et plus fréquent de certaines formes d'activité mentale, privilégiées dans une société en cours d'acculturation technique, ce tableau montre que l'adaptabilité moyenne augmente en pays neuf, dans des proportions et à un rythme que tout psychologue habitué aux pays stabilisés jugera inespérés.

On demande souvent aux psychologues et aux sociologues de mettre au point des méthodes bien étudiées, qui puissent ensuite être publiées afin d'en généraliser l'emploi en les rendant accessibles à un personnel d'application, nombreux et moins qualifié. Ce seul tableau montre combien il serait délicat de fixer pour plusieurs années des normes standardisées dans une de ces capitales. A plus forte raison, est-il impossible de généraliser à d'autres capitales des normes calculées à un moment donné dans l'une d'elles. On voit enfin combien risquent d'être stériles des projets actuellement à l'étude où l'on se proposerait de standardiser tests et normes à l'échelle interafricaine, pour des pays dont les niveaux socio-économiques, les formes de culture traditionnelle, l'apport culturel étranger sont très différents. Les comparaisons absurdes et sans signification profonde entre les résultats obtenus dans tel ou tel pays, constituent un danger double : basse compétition d'une part, discrédit des méthodes de psychologie appliquée de

l'autre. Pourrait-on, par exemple, conclure des résultats donnés plus haut que la population de la capitale "A" est plus évoluée, plus intelligente que celle de la capitale "B"? Des résultats statiques enregistrés hâtivement une seule année eussent pu le suggérer ; mais la mise en évidence d'une élévation constante de score qui montre par exemple qu'en 1958 celui de la capitale "B" est plus élevé que celui de "A" en 1954 suffit à montrer l'absurdité de conclusions superficielles. On peut tout au plus penser que comme deux véhicules sur une même route, l'un a démarré avant l'autre.

En fait, les méthodes de psychologie appliquée doivent être, dans les pays neufs plus encore que dans les pays stabilisés, sans cesse étudiées en fonction de chaque problème précis à résoudre, à un moment déterminé de l'évolution économique, sociale et psychologique d'un groupe humain défini.

Des doutes ont été exprimés sur la signification des tests psychotechniques en pays sous industrialisé et sur la légitimité de leur utilisation pratique. En effet, on a trop longtemps admis, l'hypothèse implicite que des tests appréhendent, au delà des diversités des milieux et des conditionnements humains, soit des traits spécifiques à un groupe (éthnique ou autre) soit des traits identiques chez tous les hommes. Ce point de vue de psychologie différentielle a stérilisé beaucoup de recherches faites en pays sous-développé, alors que la seule mise en évidence de la rapidité des transformations humaines eût dû suffire à indiquer la prédominance des facteurs de milieu et le danger de toute vue trop statique.

On se gardera donc de penser qu'en appliquant tel ou tel test on pourra, en Afrique, établir un quotient intellectuel, un âge mental ou mesurer une aptitude individuelle telle que mémoire, intelligence, dextérité etc... selon des méthodes largement dépassées. Il ne suffit pas non plus de recalculer moyennes et étalonnages, ni d'africaniser le matériel de tests en substituant le dessin d'un palmier à celui d'un sapin : toute tache de test est liée d'abord à la culture qui a créé ce mode d'investigation ; c'est donc uniquement pour étudier l'adaptation des sujets à un monde où se répand cette culture que l'application des tests est légitime, tout au moins jusqu'à ce qu'une stabilisation et une homogénéisation culturelle, de forme probablement originale, ne se soient établies. Dans un milieu humain donné, le système éducatif tend à favoriser l'apparition et le développement de conduites conformes à la hiérarchie des valeurs en usage dans la société considérée : ainsi, selon les sociétés, l'éducation tend à la limite à produire des savants, des guerriers courageux, des hommes d'affaires, des sportifs, des sages ou des saints, etc... Il est clair que dans des sociétés qui ne sont de culture ni scientifique, ni technique, où les activités manuelles jadis serviles, ont été traditionnellement discréditées et se sont trouvées réduites le plus souvent à des recettes stéréotypées, il importait moins au groupe de voir apparaître de bons ouvriers ou des ingénieurs que des juges sages, de fins orateurs ou des chefs valeureux. Ainsi le mode d'éducation du jeune enfant ne développait guère celles des qualités psychologiques qu'on estime, en société technique, indispensables à la compréhension de l'environnement concret, et aux interventions qui ont pour but l'utilisation rationnelle de cet environnement physique au profit

de la société. Lorsque certains voulurent mesurer en Afrique, à l'aide de tests, les capacités supposées indispensables à la formation d'ouvriers ou de techniciens, ils arrivèrent à des conclusions d'un pessimisme absurde : personne n'atteignait les normes prévues, mêmes ceux qui se trouvaient déjà être des ouvriers appréciés . Les tests des pays techniques étaient-ils donc inutilisables en pays sous-développés? Les instruments seuls étaient-ils en cause ? ou fallait-il s'attendre à des différences radicales dans les psychismes ?

En attendant que des recherches approfondies apportent des réponses, une intervention pragmatique reste possible : rien n'interdit de considérer que les tests sont des échantillons de "tâches-types" des cultures modernes et de tenter de les utiliser à mesurer les divers degrés d'adaptation à certains types de tâches.

En écartant ainsi la croyance implicite qu'un test appréhende un trait définitif et particulier d'un individu, en admettant qu'il mesure tout au plus un niveau actuel de performance devant un travail peu familier, on conçoit vite que ce qui importe c'est la notion d'éducabilité ou d'adaptabilité. Le bilan momentané des niveaux de réussite d'un individu n'a aucune signification par rapport à des normes établies sur des populations de culture différente ; il n'est intéressant que comme élément de pronostic, valable pour des adaptations ultérieures à des situations d'apprentissage et de travail.

Certes, on peut sur le plan de la recherche pure, étudier dans quelle mesure l'éducation en milieu non technique influe sur la finesse de discrimination perceptive de l'adulte dans telle ou telle condition expérimentale, mais on ne peut attendre la conclusion de cette étude pour former des ajusteurs, si l'économie du pays en a un besoin urgent. Il serait enfin absurde, sous prétexte que les normes de discrimination perceptive ne sont pas superposables à celles que l'on a établies en Suisse, de décider qu'il est impossible de former de bons horlogers en Afrique.

La notion de mesure par les tests de degrés d'adaptabilité à des tâches plus ou moins complexes a permis d'aboutir à des résultats pratiques probants dans le domaine de la sélection et de la formation professionnelle. Cette position prudente a permis par ailleurs de multiples observations et une approche plus souple de caractéristiques psychologiques actuellement apparentes en Afrique que nous citerons plus loin. Après sélection par tests, suivant ce principe, la formation de plus de 800 ouvriers a été suivie dans divers centres de Formation Professionnelle Rapide préparant à des métiers qualifiés du bâtiment et de la métallurgie (Maçonnerie, Béton armée, Charpente, Carrelage, Menuiserie, Plomberie sanitaire, Electricité, Tôlerie-Chaudronnerie, Mécanique Automobile...etc).

Les calculs initiaux de validation de la batterie de tests avaient porté sur 235 sujets choisis parmi près de 2 000 candidats et répartis en 17 sections de formation. Les coefficients de corrélation corrigés en raison des taux de sélection ont été compris entre . 50 et . 80 pour 12 des sections (dans 8 cas ils étaient égaux ou supérieurs à . 70). Après ces expériences de validations multiples, menées en 1955, de nombreuses autres vérifications de la validité des pronostics d'adaptabilité émis après examen psychotechnique ont pu être établies. D'une façon générale le recours à la méthode psychotechnique permet d'assurer

la réussite de 80 à 85 % des jeunes gens mis en apprentissage alors que le taux d'échecs habituel est de 50 à 70 % si l'on utilise des critères uniquement scolaires et peut s'élever à 95 % si l'on prend au hasard des apprentis pour des formations "sur le tas" très complexes (de mécanique par exemple).

Si cependant des validations psychotechniques excellentes montrent que les tests permettent des pronostics exacts sur l'adaptation au travail d'adultes et d'adolescents dans des secteurs de l'emploi très divers (employés de bureau, de commerce, fonctionnaires, ouvriers etc...) les résultats sont beaucoup moins probants lorsqu'il s'agit de prédire l'adaptation scolaire d'enfants prépubères : il semble qu'à ces âges, trop de facteurs perturbants s'exercent sur des personnalités particulièrement fragiles et dominées par leur affectivité. Une grande prudence s'imposera donc dans toute tentative de transposition de système d'orientation professionnelle par tests avant la puberté.

Un autre avantage important de la sélection sur tests d'adaptabilité est de permettre la constitution de groupes d'apprentis de niveau psychologique homogène. Ceci facilite grandement la formation, en accroît la rapidité ou permet de viser un niveau de qualification supérieur. Cette notion d'homogénéité des groupes d'apprentissage à laquelle on ne prête pas une attention suffisante dans le domaine scolaire en France, est encore plus importante en Afrique où, aux autres sources d'hétérogénéité s'ajoute l'inégalité des contacts d'acculturation.

En marge de leur utilisation pratique, les expérimentations psychotechniques ont permis diverses observations sur certaines particularités caractéristiques des conduites des jeunes africains examinés.

L'observation la plus frappante concerne l'irrégularité des performances obtenues selon que le problème de test est posé en utilisant un matériel plus abstrait ou comporte la manipulation d'objets.

Un jeune adulte capable devant un dessin non figuratif complexe d'en analyser finement les parties composantes, de déterminer selon quelles lois de série rigoureusement logiques elles s'enchaînent et d'aboutir à la solution correcte du problème posé (principe du test Progressive Matrices de Raven) se montrera tout à coup d'une maladresse stupéfiante dès qu'on lui propose d'assembler 4 cubes pour reproduire un modèle élémentaire. (test des cubes de Kohs). Il semble à le voir manipuler que réflexion et action sont incompatibles. Ce sujet qui, mentalement, combinait plusieurs facteurs pour aboutir à une solution rigoureuse, n'arrive plus à tenir compte à la fois de la couleur et du dessin des cubes qu'il a entre les mains. Cette maladresse étonnante apparaîtra encore lorsqu'il s'obstinera à vouloir placer une pièce perforée sur des ergots manifestement trop écartés (Test des disques de Bonnardel) ou dans diverses autres épreuves de performance où le problème exige une manipulation concrète.

Sur le vu de tels résultats un psychologue de pays industrialisé conclurait à une incapacité psychomotrice ou sensorimotrice. La discordance des résultats entre tests de ce secteur et tests intellectuels ou verbaux étant par trop évidente. Il aurait raison s'il s'agissait d'adolescents auxquels l'environnement usuel a offert depuis la

petite enfance toutes les occasions de pratiquer les exercices sensori-moteurs et psycho-moteurs qui faciliteront des habiletés valorisées dans la vie quotidienne des adultes. Mais en milieu non technique rien n'a préparé les adolescents à ces manipulations. Des expérimentations ont montré que sur un matériel donné, on pouvait en très peu de temps améliorer par l'exercice les performances enregistrées et ceci dans de telles proportions que l'hypothèse de déficit irréversible peut immédiatement être écartée.

Cependant, malgré les progrés rapides qu'entraîne un bref exercice de manipulations, il reste que l'expérimentation sensori-motrice du jeune âge paraît être une condition nécessaire pour élever le niveau ultérieur des performances dans un ensemble très vaste de tâches sensori-motrices diverses alors qu'une habileté tardivement acquise par un adolescent dans un domaine précis et limité n'entraînera pas un accroissement général des habiletés sur d'autres tâches voisines : de là des discordances curieuses. Ainsi tel excellent mécanicien, rompu à toutes les opérations professionnelles de son métier, ne viendra pas à bout d'un puzzle en bois infiniment plus simple que la moindre des tâches qu'il exécute quotidiennement.

En partant de semblables observations et en analysant les raisons profondes du succès des méthodes de Formation Professionnelle Rapide introduites au cours de ces expériences, il s'est avéré que l'essentiel de leur mérite n'est peut-être pas tant dans la rigueur de l'enchaînement des opérations professionnelles, ni dans la réalisation d'exercices de difficulté progressivement croissante, mais dans le fait que devant tout geste ou tout acte professionnel on demande d'abord à l'apprenti d'observer, de comprendre et de réfléchir. Ce processus d'intégration de la réflexion à l'activité manuelle est à l'opposé de sa tendance première, de ses habitudes et de celles de son groupe. Dès qu'il a compris que tout geste professionnel a un but logique, que toute opération professionnelle a sa signification l'apprenti a franchi un cap décisif et l'on voit à partir de ce moment disparaître les conduites discordantes signalées plus haut.

D'autres observations recueillies grâce à la psychologie appliquée sont aussi pleines d'intérêt, mais dépasseraient les limites du présent exposé. Citons :

- La mise en évidence des différences de personnalité liées aux conditionnements éducatifs de diverses ethnies
- L'importance de la mise en situation globale dans la réussite des apprentissages
- L'importance de la notion de "rôle" et de la "sanction sociale" dans les adaptations professionnelles à des postes modernes comportant des responsabilités.

En conclusion, les méthodes de la psychologie appliquée ont de larges champs d'utilisation dans les problèmes de sélection et de formation professionnelle en Afrique. Sur l'exemple de plus caractéristique qui est celui de la formation d'ouvriers qualifiés, on a cherché à mettre en évidence les enseignements que l'on peut tirer de l'application de cette méthode. Mais l'hétérogénéité actuelle des milieux humains, leur transformation rapide, les aspects multiples que prennent les problèmes

du travail toujours liés à des caractéristiques socio-économiques locales exige des solutions originales spécialement adaptées à chaque milieu et à chaque moment pour être bien adéquates. Ceci a le grave -inconvénient habituel en Afrique pour la plupart des problèmes techniques- que l'on doit avoir recours à des spécialistes réellement qualifiés, car la généralisation de solutions toutes faites n'est concevable que si tous les facteurs sont stables et comparables ce qui n'est jamais le cas dans l'Afrique actuelle.

Si l'on veut utiliser ces méthodes à bon escient, il faudra donc un personnel compétent pour analyser les objectifs, choisir les procédés, modifier instruments et normes, en un mot s'adapter à chaque cas.

C'est une erreur d'isoler l'application de méthodes psychologiques des autres aspects de l'adaptation au travail : sélection, formation, intégration sont des opérations complémentaires étroitement coordonnées pour lesquelles il faut tenir compte autant du milieu humain d'origine où s'opèreront les recrutements que des milieux de travail où s'insèrera le personnel formé.

Cependant, dès qu'une solution choisie reste figée pendant plusieurs années, elle est probablement dépassée, donc inadéquate : les projets et les plans de formation à court et long terme sont indispensables ; mais ils doivent prévoir des possibilités d'ajustement continu à la dynamique de l'évolution.

Les apports de la psychologie appliquée dans le domaine du Travail aux étapes actuelles du développement socio-économique des Etats d'Afrique.

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Les observations et conclusions sur les apports possibles de la psychologie appliquée dans les problèmes de main-d'oeuvre qui font l'objet de cet exposé ont été recueillies et élaborées au cours de dix années d'expérimentation et d'applications méthodiquement poursuivies dans les pays d'Afrique équatoriale et notamment dans la République du Congo - Brazzaville.

Le problème majeur de la formation des cadres reçoit actuellement des solutions multiples, mais à tous les niveaux de l'emploi, l'Afrique a connu et connaît encore un manque endémique de bras. La partie de population disponible pour des activités modernes n'est la plupart du temps qu'une très faible fraction d'une population clairsemée : la majeure partie restant encore attachée à des activités traditionnelles et notamment aux indispensables productions vivrières.

Avant que l'industrialisation ne se développe, et ne se différencie, 100 manoeuvres dirigés tant bien que mal par un contremaître arrivaient à effectuer le travail de 10 ouvriers bien outillés et bien formés. Depuis plusieurs années, le nombre ne suffit plus et il a été indispensable de former des travailleurs de qualité et leur maîtrise et de trouver des méthodes qui permettent d'utiliser au mieux les disponibilités humaines.

En pays de culture technique et de tradition industrielle, où toute la population est scolarisée depuis le début du siècle, on peut estimer qu'en pratique tout homme a des chances raisonnables de réussir normalement l'apprentissage d'un métier qualifié : 80 % du "tout venant" y réussit, comme le montrent les statistiques de la formation et de l'emploi. En conservant les mêmes critères de qualification technique, on constate à l'heure actuelle que dans la population urbaine scolarisée d'une capitale africaine on peut, suivant les cas, trouver de 30 à 60 % de jeunes adultes "tout venant" capables de réussir des apprentissages de métiers qualifiés. Si l'on prend des apprentis au hasard, le risque d'échec est donc déjà important ; il devient considérable pour des métiers très complexes (mécaniciens motoristes par exemple) où les chances de réussite sont de 1 à 10 % suivant les Etats.

Ces chiffres concernent la fraction de population urbanisée de façon stable et régulièrement scolarisée. Mais il n'est guère de capitale qui n'ait connu un afflux considérable de population des campagnes, population encore incomplètement adaptée à son nouveau mode de vie, irrégulièrement scolarisée et peu familiarisée avec les impératifs du travail salarié. De ce fait, dans une telle population, les taux probables de réussite en formation professionnelle diminuent considérablement et se situent entre 10 et 25 % selon les Etats.

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DANS L'INTÉRÊT DES RÉGIONS PEU DÉVELOPPÉES

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Point de l'ordre du jour : B.3 Portugal

# LA FORMATION AUX TECHNIQUES DE MANAGEMENT AU PORTUGAL

Par E. GOMES CARDOSO,
Directeur du Service
de Productivité de l'INII

Les mémoires rédigés à l'intention de la Conférence des Nations Unies sur l'application de la science et de la technique dans l'intérêt des régions peu développées sont des documents de travail. Ils sont publiés tels qu'ils ont été présentés et les assertions et opinions qu'ils contiennent sont celles de leurs auteurs.

## NOTES

1. Les mémoires choisis pour être présentés en séance générale pourront être obtenus à la Conférence dans les langues officielles suivantes des Nations Unies: anglais, espagnol, français et russe.

2. Les mémoires choisis pour être présentés en séance spéciale pourront être obtenus à la Conférence dans l'une seulement de ces langues officielles.

3. Les résumés qui ont été rédigés pour tous les mémoires par les auteurs de ceux-ci pourront être obtenus à la Conférence dans les langues officielles suivantes des Nations Unies: anglais, espagnol, français et russe.

4. Préalablement à la Conférence, les mémoires et les résumés ne feront pas l'objet d'une distribution générale mais d'un tirage restreint destiné aux délégations des gouvernements et autres participants officiels. La publication et la distribution générale des actes de la Conférence s'effectueront conformément aux règles et pratiques agréées par le Comité des publications des Nations Unies.

# LA FORMATION AUX TECHNIQUES DE MANAGEMENT AU PORTUGAL

E. Gomes Cardoso
Directeur du Service de Productivité de l'INII

## 1 - Introduction

### a) Objet de l'étude

Ce travail a pour but de présenter, à titre d'exemple, une tentative de solution de l'un des points fondamentaux de ce qui constitue réellement le développement intégral des peuples - la formation des dirigeants.

### b) Portée

. La portée de l'expression "management training" s'étend, dans cette étude, à la formation et au perfectionnement de tous les individus exerçant des fonctions de "management".

Le terme "management" englobe les notions suivantes:

- prise de décisions adaptées aux possibilités, aux risques, aux données de la situation économique, technique, matérielle et humaine de l'institution.
- réalisation de la politique et des objectifs adoptés, au moyen d'actions organisées et effectives, et par un groupe d'homme déterminés (administration).
- appréciation des résultats par rapport à la politique et aux objectifs prévus (administration).
- élaboration des systèmes de structures, de règles et d'informations à mettre en oeuvre pour faciliter le fonctionnement de l'institution (organisation).

. Étant donné les limites et les caractéristiques du présent travail, il laisse de côté le problème de la formation de base des cadres dirigeants.

### c) Importance du problème

Le problème posé par la formation des cadres de direction des entreprises et leur adaptation aux exigences des activités industrielles est aussi vieux que l'industrie elle-même.

Seulement il revêt aujourd'hui une dramatique acuité, en raison des modifications radicales qui se sont opérées dans tout le contexte industriel. En simplifiant, on peut envisager, dans le complexe industriel actuel, trois grands pôles caractéristiques: la dimension, l'évolution scientifique et technique, et les facteurs humains.

Quand nous parlons de "dimension", nous ne pensons pas uniquement à la notion de l'étendue physique de l'entreprise. Il s'agit, plus généralement, de l'importance et de la complexité du cadre des activités industrielles du fait d'une croissance et d'une prolifération continues et interdépendantes, aussi bien au stade de la production qu'à celui du marché, en ce qui concerne les ressources financières ou de personnel, soit au niveau de l'entreprise, du secteur, soit à l'échelon national et international, etc.

L'évolution des connaissances scientifiques et techniques: c'est là encore un point tres important, en raison du développement spectaculaire observé, tant dans les domaines classiques des procédés de production, qu'en ce qui concerne les nombreuses techniques de "management" ayant réellement aujourd'hui une base scientifique.

Enfin, le dernier point évoqué n'est certes pas le moins important, il est même essentiel: il s'agit des facteurs humains dans l'industrie.

En effet, cette évolution des connaissances scientifiques et techniques, dont nous avons déjà parlé et qui porte sur tous les éléments de l'efficience du travail industriel, a révélé le rôle prépondérant des facteurs physiques et surtout psychiques dans le rendement du travail. Il a fallu envisager sous un angle tout-à-fait different la situation de l'homme dans l'industrie.
Devant des modifications aussi profondes, dont nous avons tenté de présenter, de façon peut-être un peu schématique, les points essentiels, les méthodes traditionnelles de formation des dirigeants se révèlent insuffisantes. Dans la plupart de ces nouveaux domaines l'expérience professionnelle est inexistante; l'enseignement scolaire reste trop statique; l'intuition apparaît comme de plus en plus discutable... et faillible.
La seule solution est de donner un caractère permanent au perfectionnement et à la formation des cadres dirigeants de l'industrie.

2 - Action réalisée dans le domaine de la formation - Description et Critique.

a) Formation générale et spécialisée en matiere de techniques de "management".

Un programme de formation aux techniques de "management" doit faire partie intégrante d'un programme général de formation à l'échelon national.
L'élaboration d'un tel plan national, qui est toujours longue et difficile, est généralement fondée sur des éléments appartenant au passé (évolution démographique, distribution de la "demande" d'enseignement, distribution de la population active, etc.) auxquels se joignent des éléments prévus ou souhaitables (développement économique, besoins manifestés par les "consommateurs", etc.) et des indications fournies par d'autres nations dont l'évolution est comparable.
Dans le cas du Portugal, il y a bien une étude en cours sur les besoins en matière de formation à l'échelon national (a), mais on a jugé préférable de ne pas en attendre les résultats; on a donc décidé, pour élaborer les premiers programmes, de procéder à une enquête directe dans les milieux intéressés, toute l'action future devant dépendre, en définitive, de leur réaction.
Au cours de cette enquête, on soumit aux milieux industriels et professionnels (b) un plan de cours, préparé de façon à donner toute l'importance voulue aux techniques dont l'application devait être la plus concrète - Organisation de la Production et Contrôle de Gestion - et aux techniques que on a consideré aussi importantes bien que moins immediates - Direction, Problèmes Humains et Organisation Commerciale (V. en Annexe - Plan des Actions de Formation - Enquête dans l'Industrie). Deux types de cours et de séminaires de durée différente (2,5 et 5 jours) étaient prévus, ils devaient grouper 20 auditeurs et auraient lieu dans les deux principaux centres industriels du pays (Lisbonne et Porto).
On procéda de même au cours des années suivantes (61 et 62), en se laissant guider largement, dans l'élaboration des programmes, par l'opinion des participants, systématiquement consultés. Il y a tout lieu de penser qu'à l'avenir on tiendra compte également, dans une large mesure, des conclusions de l'étude déjà citée sur les besoins du pays en matière de formation.

(a) Étude réalisée par le Centre d'Études de Statistique Économique, avec la participation de l'INII et de l'OCDE.

(b) Il importe de signaler qu'on avait au préalable éveillé leur intérêt au moyen d'un cycle de conférences consacré à des questions de Productivité.

Comme suite aux enquêtes réalisées, on a organisé en 1960/61 et 1961/62 cent deux cours et séminaires, fréquentés par 2.102 participants, et où furent traités les sujets suivants: Direction et Gestion d'Entreprises, Organisation de la Production, Organisation Commerciale et Problèmes Humains (détails en annexe).
Les sessions ont été dirigés par des moniteurs de différentes nationalités - portugais, belges, espagnols et surtout français, grâce à l'excellente collaboration du Service de Productivité du Commissariat Général du Plan d'Equipement et de la Productivité (CGPEP) et de l'Institut de Perfectionnement aux Méthodes de Contrôle de Gestion (IPMCG) de Paris.
On trouvera ci-après l'analyse critique de l'action réalisée, en ce qui concerne la distribution par sujets, la réaction de l'industrie, la répartition par dimension des entreprises et par secteurs industriels, ainsi que la profondeur de l'intérêt suscité.

i) Distribution des participants par sujets - Réaction de l'Industrie

TABLEAU 1

| Sujets / Années | Direction et Gestion | | Production | | Commerce | | Problèmes Humains | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | R | P | R | P | R | P | R | P | |
| 1960/61 | 31% | 36% | 36% | 36% | 16% | 14% | 17% | 14% | 100% |
| 1961/62 | 34% | 35% | 25% | 26% | 23% | 18% | 18% | 21% | 100% |

R= Réalisés P= Prévus

L'excellente corrélation - pratiquement une identité - entre les prévisions et les réalisations traduit une réaction uniforme des milieux intéressés; cela ne fait que confirmer l'importance de l'élaboration des plans initiaux de formation: les seuls éléments d'orientation.

ii) Distribution des participants selon les dimensions de l'entreprise

TABLEAU 2

| Dimensions / Années | 0/100 | 100/200 | 200/500 | 500/1000 | 1000/4000 | >4000 | Total |
|---|---|---|---|---|---|---|---|
| 1960/61 | 21% | 15% | 14% | 30% | 11% | 9% | 100% |
| 1961/62 | 10% | 13% | 25% | 15% | 32% | 5% | 100% |

Les participants proviennent, pour la plupart, d'entreprises ayant 500 à 4000 ouvriers; on notera le pourcentage important de participants appartenant à des entreprises dans la phase de transition (500/1000 ouv.), surtout pendant la première année.
Les participants venant de petites entreprises sont peu nombreux, ceci vraisemblablement en raison des difficultés de langue, du prix des inscriptions et du défaut d'adaptation des programmes.

iii) Distribution des participants par secteurs industriels (%)

TABLEAU 3

| Secteurs / Années | Alimentation et boissons | Produits chimiques | Pétrole et dérivés | Textile | Transports | Industries Mécaniques | Electricité | Commerce | Services Publics | Autres | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1960/61 | 6 | 14 | 5 | 7 | 6 | 14 | 13 | 14 | 9 | 12 | 100% |
| 1961/62 | 13 | 20 | 5 | 2 | 11 | 23 | 6 | 0 | 7 | 3 | 100% |

Plusieurs secteurs industriels importants (textiles, liège, conserves, construction civile, etc.) sont à peine représentés ou même pas du tout.
Il importe également de signaler que si, dans certains secteurs, la participation est en progrès (transports, alimentation et boissons, industries chimiques et mécaniques), il en est d'autres où elle est nettement en régression (textiles, électricité, activités commerciales et services publics).

iv) Profondeur de l'intérêt suscité

Pour tenter d'exprimer la profondeur de l'intérêt suscité par ces cours de formation, on a élaboré deux tableaux fondés sur le pourcentage d'entreprises qui ont suivi les cours, par rapport au total des entreprises du ou des secteurs considérés. Ces éléments sont groupés, d'une part suivant les dimensions de l'entreprise et, de l'autre, par secteurs industriels. Les chiffres présentés n'ont qu'une valeur documentaire, car il est extrêmement difficile de recueillir et de comparer des éléments statistiques, et on a été obligé d'adopter des définitions et des simplifications qu'on ne saurait indiquer ici.

POURCENTAGE D'ENTREPRISES INTERESSEES/SECTEURS INDUSTRIELS

TABLEAU 4

| Secteurs | Alimentation et boissons | | Industries Chimiques | | Textiles | | Industries Mécaniques (c) | | Electricité | |
|---|---|---|---|---|---|---|---|---|---|---|
| Centres | 60/61 | 61/62 | 60/61 | 61/62 | 60/61 | 61/62 | 60/61 | 61/62 | 60/61 | 61/62 |
| Lisbonne | 19% | 14% | 19% | 11% | 13% | 4% | 34% | 65% | 21% | 8% |
| Porto | 10% | 3% | 4% | 4% | 5% | 2% | 28% | 18% | 13% | - |
| Autres | 1% | 1% | 3% | 2% | 0,5% | 0,5% | 22% | 22% | 5% | 0% |
| Total | 4% | 3% | 7% | 5% | 2% | 1% | 28% | 32% | 7% | 7% |

(c) Ce poste groupe un certain nombre d'industries: aluminium, acier inoxydable, fonte émaillée, articles en fil de fer, vis, tréfilerie et matériel de transport. Les chiffres relativement élevés de cette colonne sont donnés sous toutes réserves, car il est difficile d'ajuster le titre en question aux classes statistiques.

POURCENTAGE D'ENTREPRISES INTERESSEES/DIMENSIONS

TABLEAU 5

| Dimensions-n°d'ouvriers | 0-100 | | 101-200 | | 201-400 | | 401-800 | | 801-1600 | | 1601-3200 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Années / Centres | 60/61 | 61/62 | 60/61 | 61/62 | 60/61 | 61/62 | 60/61 | 61/62 | 60/61 | 61/62 | 60/61 | 61/62 |
| Lisbonne | 7 | 2 | 52 | 57 | 36 | 32 | 48 | 45 | 33 | 50 | 33 | 100 |
| Porto | 2 | 0,3 | 24 | 9 | 9 | 14 | 40 | 30 | 33 | 33 | 0 | 50 |
| Autres | 0,5 | 0,4 | 4 | 1 | 6 | 9 | 31 | 28 | 80 | 60 | 0 | 0 |
| Total | 1,5 | 0,6 | 12 | 8 | 14 | 15 | 47 | 40 | 81 | 56 | 28 | 80 |

Note - On a envisagé ici que les cinq secteurs industriels cités dans le tableau précédent.

On peut en déduire, ce qui ne fait d'ailleurs que corroborer les conclusions déjà formulées, que l'intérêt suscité dans les différents secteurs industriels n'a pas été très grand, ceci en raison de la très faible participation des petites et moyennes entreprises.

b) Groupes d'Etudes professionnelles et Stages divers

Comme suite aux actions de formation, et afin de créer un milieu permanent de perfectionnement et de coopération professionnelle, on a prévu un certain nombre de groupes d'études professionnelles, dont fonctionnent déjà un Groupe d'Auto-Organisation de l'Industrie Métallo-Mécanique et des Groupes d'Etude d'Approvisionnement, du Travail et des Problèmes de Personnel.
Il y aura aussi très prochainement un cours de spécialisation en techniques de productivité, qui durera 4 à 5 mois et bénéficiera de l'excellente collaboration d'organismes français - ASTEF, CFPEP et IPMCG.

c) Formation de Contremaîtres

Comme il y avait intérêt à toucher les milieux industriels en allant depuis l'administration jusqu'aux cadres spécialisés, pour trouver la compréhension, l'appui et l'unité d'action indispensable, on a cru bon de commencer les activités en ce domaine par une étude - diagnostic sur le "Problème des Contremaîtres dans l'Industrie Portugaise". Cela avait le double avantage de permettre de définir le plan de formation le plus efficace, et d'éveiller en même temps l'intérêt des industriels, soit par la diffusion de cette étude, soit par les actions de formation décrites ci-dessus.
Cette étude fut réalisée à partir des éléments de structure de l'industrie et des résultats d'une enquête dans les différents secteurs industriels; bien que l'enquête n'ait porté que sur un petit nombre d'entreprises, on la jugée assez représentative, d'autant plus que les résultats obtenus étaient internationalement valables.
L'enquête avait essentiellement pour but de recueillir des données générales sur la situation actuelle des contremaîtres dans l'industrie (âge, ancienneté, niveau d'instruction, fonctions, degré d'encadrement, méthode de recrutement, méthode de sélection, mode de rémunération, etc.), et l'opinion des directions des entreprises et des contremaîtres eux-mêmes sur les besoins éprouvés en matière de formation, compte tenu des perspectives de l'entreprise et des fonctions remplies; les résultats on révélé l'influence qu'exercent sur la formation des contremaîtres des facteurs tels que: le secteur

industriel, les dimensions de l'entreprise et sa situation géographique.
Le plan de formation, élaboré en fonction du nombre de contremaîtres existants et des prévisions pour les prochaines années, doit s'adresser aussi bien aux futurs contremaîtres qu'à ceux qui sont déjà en fonctions.
Dans les deux cas, on a envisagé deux solutions: la formation dans l'entreprise même ou dans les écoles professionnelles. Cette dernière est évidemment préférable, étant donné sa portée et ses possibilités de multiplication.
Comme on manquait de moniteurs portugais, on a fait appel à la collaboration de plusieurs organismes étrangers, et on doit aborder sous peu, dans le cadre du plan de formation élaboré, une phase de préparation de moniteurs nationaux, avec l'appui des autorités responsables de la formation professionnelle.

3- Prochaines Activités

Dans le programme prévu pour 1962/63, qui est présenté en annexe, on s'est efforcé, tout en restant fidèle aux principes adoptés pour les précédentes années, d'éliminer ou d'attenuer quelques erreurs ou omissions signalées dans le chapitre précédent. Nous pensons, entre autres, à certaines particularités d'organisation, comme les cours spécifiques par secteurs industriels, aux facilités prévues pour les petites entreprises, au cours général de caractéristiques post-universitaires, à la première participation importante de moniteurs portugais, au début d'une action rationnelle au niveau des contremaîtres, etc.
Il importe moins, toutefois, d'énumérer ces modifications ou ces rectifications, que l'on justifie facilement en comparant les actions réalisées aux structures existantes ou souhaitables, que de conclure en indiquant, aussi brièvement et aussi simplement que possible, le point de vue qui a orienté l'action en matière de formation de cadres de direction.
Dans le monde d'aujourd'hui, toutes les activités humaines s'exercent dans un contexte, qui leur impose des exigences de plus en plus complexes, où les caractéristiques changent constamment. On ne s'y adapte qu'au prix de transformations radicales, et une bonne formation nous apparaît comme l'un des moyens les plus efficaces de favoriser les indispensables mutations psychiques.
En raison de ses multiples implications, en raison aussi de l'importance primordiale qu'elle donne aux facteurs humains, la formation aux techniques de "management" nous semble tout indiquée pour répondre aux exigences de l'un des principaux points qui se dégagent de ce contexte: une nouvelle structuration des activités, une organisation et une conception différentes des rapports entre les hommes et de leurs attitudes, pour aboutir à une concentration et participation convergentes.
En fait, la préparation aux techniques de "management" nous apparaît comme l'une des interventions les plus positives et les plus raisonnées de l'humanité dans sa propre évolution, comme une contribution réelle et efficace à la construction de l'avenir de l'homme par l'homme.

PLANS DES ACTIONS DE FORMATION - ENQUÊTE DANS L'INDUSTRIE

Ce tableau donne les différents sujets de cours indiqués dans les enquêtes réalisées en 1960, 1961 et 1962

TABLEAU 6

| Sujet des cours | 1960 | 1961 | 1962 |
|---|---|---|---|
| DIRECTION ET GESTION | | | |
| Direction et Gestion d'Entreprises | × | × | × |
| Comptabilité | × | | |
| Gestion Budgétaire | × | × | × |
| Org.Administrative | × | | × |
| Conduite de Réunions | | × | × |
| Jeux d'Entreprises | | × | × |
| Gestion Prévisionnelle I | × | × | × |
| " " II | | × | |
| Statistique I | | × | × |
| " II | | × | × |
| Investissements | | | × |
| Tableau de bord | | | × |
| Structures | | | × |
| Gestion financière | | | × |
| Invest.opérationnel | | | × |
| PRODUCTION | | | |
| Org.de la production | × | × | |
| Étude du travail I | × | × | × |
| " " " II | | × | × |
| Planification et Contrôle de Production | × | × | × |
| Étude des Méthodes | × | | |
| Mesure du travail | × | | |
| Contrôle de qualité | | × | × |
| Gestion de Stocks | | × | × |
| Entretien | | | × |
| Implantation et manutention | | | × |

| Sujet des cours | 1960 | 1961 | 1962 |
|---|---|---|---|
| COMMERCE | | | |
| Org.Commerciale | × | × | × |
| Promotion des ventes | × | × | × |
| Formation à la vente | | × | × |
| Étude de marchés | | × | × |
| Distribution | | | × |
| Politique Commerciale | | | × |
| Org.Administrative | | | × |
| Exportation | | | × |
| PROBLÈMES HUMAINS | | | |
| Gestion du Personnel I | | × | × |
| " " " II | × | × | × |
| Rémunération | × | × | |
| Sélection du Personnel | | × | × |
| Qualification et notation | | × | × |
| Formation du personnel | | | × |
| Conditions de travail | | | × |
| COURS SPÉCIAUX | | | |
| Cours par secteurs industriels | | | × |
| Cours destinés aux jeunes diplômés des universités | | | × |

NOTE:

Pour tous renseignements complémentaires, s'adresser au Service de Productivité de l'"Instituto Nacional de Investigação Industrial", Rua Garcia de Orta, 68 - - Lisbonne - 2 Portugal

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Agenda Item : B. 2. 2

Israel

# EXPERIMENTS IN VOCATIONAL EDUCATION IN A DEVELOPING COUNTRY

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Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

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## 1. General Background

### (a) Population

The total population of Israel in June 1962 was estimated by the Central Bureau of Statistics at 2,293,000. As characteristic features we want to stress the high rate of immigration, especially from under-developed countries; the age structure of the population, in which young people prevail; and the unbalanced distribution of the inhabitants throughout the country.

(i) Immigration and Immigrants:

Between 1882 and 1948 more than half a million immigrants arrived, about 90 per cent from Europe, and only 10 per cent from Africa and Asia. The immigration waves afterwards brought nearly one million new citizens, more than half of them from African and Asian countries. The immigrants of European origin from countries with high educational standard, many of them worked before their emigration from their home country as professionals. Up to Hitler's rise in Europe, there was a natural selection of emigrants: Mostly young people, whereas after the Second World War, Israel absorbed survivors of the Nazi Holocaust of any age and kind. Immigrants from oriental countries ranged from cave-dwellers in Morocco to peddlars, middle class merchants and low civil servants in Iraq, most of them with an incomplete elementary education and practically no vocational training or any technological experience at all. The families of these new immigrants were on the average considerably larger than families arriving from Europe.

(ii) Age Structure of the Population:

As up to 1935 mostly people in the age group 18 - 25 arrived in the country, and as since 1948 the percentage of oriental families with many children grew to decisive proportions, and as the well-developed health services in Israel keep the infant mortality one of the lowest in the world, we find the Israeli population among the youngest on earth.

According to the Central Bureau of Statistics, we find in May 1961 in the age group of

| | | |
|---|---|---|
| 0 - 14 | - | 34.8% |
| 15 - 29 | - | 21.2% |
| 30 - 44 | - | 18.7% |
| 45 - 64 | - | 20.0% |
| 65 plus | - | 5.3% of the population. |

(iii) Geographical and Occupational distribution of the Population:

The figure of overall density of the population in the country - 106.2 per sq.Km. - is very misleading, as nearly 80% of the inhabitants are living in the northern half of the country. The rate of density in the southern half reaches only 11.8 per sq.Km. Thus, large areas of the country are uninhabited and represent a challenge especially for industrial development, independent from an abundant supply of water, which in the south is very scarce. As the pressure of immigration is

lasting and as the country is in heavy need of economics, especially industrial development for improving its trade balance and becoming more self-sufficient, settlement in/and productivization of these "Development areas" is encouraged by the Government.

About 64 per cent of the total population are living in towns, but an analysis of the occupational structure shows that in 1960 actually only 17.3 per cent of all employed persons worked in agriculture, forestry and fishing

About 11 per cent of the total population belong to minority groups (Moslem and Christian Arabs, Druze, etc.).

(iv) Economic Development:

For illustrating the trends of development we shall give some few examples:-

a. The growth of Israel Industry:

| | 1946 | 1959/60 |
|---|---|---|
| No. of Enterprises | 2,447 | 9,136 |
| No. of Employed | 46,960 | 128,300 |

b. Size of Establishments:

| | Percentage | | | |
|---|---|---|---|---|
| | 1955 | | 1959 | |
| | Persons engaged | Establish-ments | Persons engaged | Establish-ments |
| All size groups | 100.0 | 100.0 | 100.0 | 100.0 |
| 1 - 4 | 10.1 | 44.6 | 10.1 | 49.1 |
| 5 - 9 | 14.1 | 27.9 | 12.2 | 25.9 |
| 10 - 14 | 8.3 | 9.1 | 6.9 | 8.2 |
| 15 - 24 | 11.9 | 8.5 | 8.9 | 6.7 |
| 25 - 69 | 15.5 | 5.9 | 13.6 | 5.6 |
| 50 - 99 | 11.6 | 2.3 | 13.2 | 2.7 |
| 100 - 299 | 18.o | 1.4 | 16.3 | 1.3 |
| 300 and over | 10.5 | 0.3 | 18.8 | 0.5 |

(b) Education

The high percentage of children and young persons in the Israeli Population is in many respects an asset only as long as it appears as an obligation as well; as long as society is conscious of the vitality of its commitments towards preparation of all these youngsters for a productive life as members of the community, according to its future needs and their potential abilities.

The answer to these two questions is in Israel obscure - inspite of the existing development plans - for lack of information about the rate of me chanization and automation, for lack of quantitative assessments of skilled workers according to trades and for the relative unreliability of many European and American testing methods, when applied to youth of Afro-Asian origin.

Therefore educational planning has to take into account the necessity of much flexibility up to a readiness for improvisation, a strong drive to risk well-founded experimentation, and a steady preparedness to correct, to give up and to build anew.

(i) Free Compulsory elementary education:

In 1949 Parliament passed a law of free compulsory education covering the ages 5 to 14 and divided in one year kindergarten and 8 years elementary school. School attendance among the Jewish youth reaches 98 per cent and among Arab boys 90 per cent.

(ii) Secondary education:

Only about 20 per cent of the graduates of elementary schools apply to the Employment Service for work - most of them looking for vacancies as craft apprentices whose training is protected by an Apprenticeship Law.

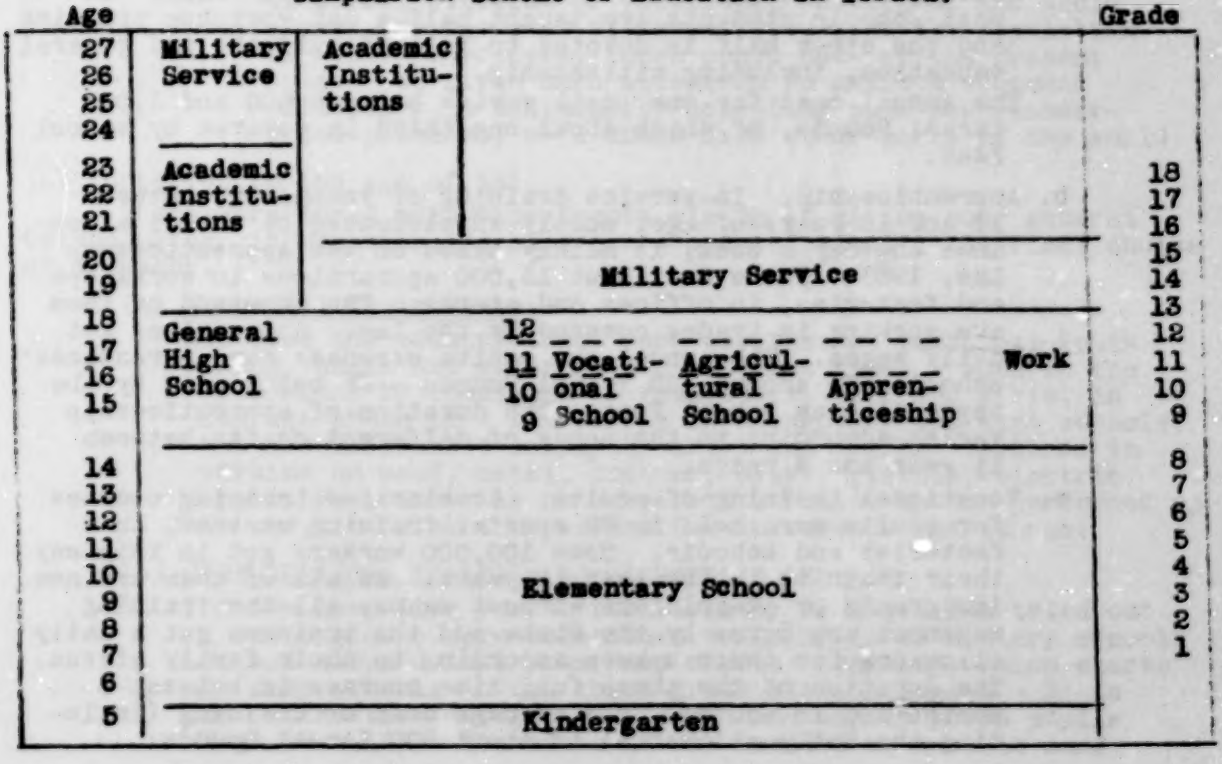
There are three main trends of secondary school:

General High School, with a 4-year curriculum, leading at an age of 18 up to academic maturity (matric);

Vocational School, giving two, three and four-year courses according to the trade, the levels of attainment or kind of specialization achieved;

Agricultural School, mostly boarding schools, with three and four-year courses.

Simplified Scheme of Education in Israel:



Nearly 80 per cent of the Israeli youth continue their education in secondary schools, but in the age group of 17-18 only about 30 per cent are in full-time educational institutions.

(iii) Higher Education:

Altogether there were in 1960/61 about 10,000 students in higher education in Universities and in the Haifa Technion.

(iv) Vocational Guidance:

Large scale vocational guidance is prepared by arts' and crafts' lessons which are held in elementary schools and carried out by employment counsellors in all offices of the employment service. No boy or girl is registered for work or apprenticeship in the Labour Exchange, without undergoing interviews with the counsellors who send more difficult cases to one of the Vocational Guidance Centres for testing. Some elementary schools make use of these Centres for carrying out group-tests for their pupils in higher classes. Handicapped persons are sent to special guidance committees and these too make use of the Vocational Guidance Centres.

(v) Vocational Education:

Vocational Education in Israel is performed in four main ways:

a. Vocational full-time schools. Fifty-two schools are dispersed all over the country and had in 1961/62 about 13,000 pupils. The Government is supervising them, holding final examinations, subsidising them and is granting scholarships. In most schools students are taught half a day workshop practice and the other half is devoted to related subjects and general education, including citizenship.

The annual cost for one pupil varies between 600 and 1,000 Israel Pounds, of which about one-third is covered by school fees.

b. Apprenticeship. In-service training of youngsters between 14 and 18 years of age, mostly supplemented by school attendance one day a week, is mainly based on the Apprenticeship Law, 1953. There are about 13,000 apprentices in workshops and factories, in offices and stores. Ten thousand of them are working in trades covered by the law. Apprentices get daily wages. The annual per capita expenses for apprentices' schools are around 125 Israel Pounds - 35 being paid by the apprentice as school fees. The duration of apprenticeship varies according to the needs of different crafts between 1½ year and 4 years.

c. Vocational training of adults. Accelerated training courses for adults were held in 22 special training centres, in factories and schools. Some 100,000 workers got in this way their training in the last 12 years. As all of them are new immigrants or ex-soldiers without means, all the training expenses are borne by the State and the trainees get a daily allowance for their upkeep according to their family status. The duration of the these full time courses is between 3 months and 18 months. The average cost of training (including the daily allowance) is about 900 Israel Pounds.

d. Supplementary training for upgrading. As the standard reached in accelerated training courses naturally cannot be very high, and as industry all the time suffered from a heavy lack of highly skilled workers, evening schools were established by the Ministry of Labour, in which every year 2,500 - 4,000 craftsmen are getting supplementary practical and theoretical training. About 50 - 60 per cent of the expenses are borne by the pupils.

## 2. Experiments in Vocational Education

(a) Special aims of experimenting with vocational guidance and education in Israel:-

(i) To find ways to make people at the earliest possible age familiar with materials, tools and processes and thus facilitate a choice of careers.

(ii) As there is a tendency among the Israeli population towards unproductive education, this way of familiarizing people with technology, should be as attractive as possible.

(iii) As many pupils are new immigrants, whose economic, social and cultural adjustment has not been completed at the time when they should start learning a trade, any system of vocational education has to include quite a share of general education, citizenship and languages.

(iv) Special stress was laid upon new ways of training which possibly would combine the advantages of different classical patterns of vocational education, and would answer the needs of different groups of the population as well. Therefore, there could not- at the present stage - be given much attention to maximum economic efficiency in training by accepting some few standardized patterns, well known from other parts of the world.

(b) Youth (up to the age of 18)

There were three main experiments aiming at giving some general technological information and experience and influencing the final choice of a career.

(i) Technical Youth Clubs:

All over the country there were established Technical Youth Clubs, which are attended two to three times a week in the afternoons by thousands of youngsters, boys and girls, in the age group 12 - 16, pupils in elementary and high schools, who are instructed mainly by arts' and crafts' teachers in working on wood, metal, leather, paper, plastic, electric appliances, etc. As no comparative follow-up was performed up to now, it is hard to assess the success of the scheme.

(ii) Prevocational training in Elementary schools:

For the last five years, the Ministry of Education tried out a new system of pre-vocational training in elementary schools. It was assumed that arts' and crafts' training, which starts in many schools in the third grade already (age 8 - 9) is not attractive enough for seventh and eighth grade pupils (age 12 - 14). Therefore it was decided to make it more

near to life by directing each class to a certain trade. General education was cut down from 30 hours a week to 28 hours. The total number of hours was raised to 40, including 10 hours workshop practice and two hours technical drawing. A follow-up showed that a percentage considerably higher than that of other pupils, wanted to commence their technical training after their graduation from elementary school, and remembering that this was the main purpose, the scheme was a success. But it should be kept in mind that cutting down general education in elementary schools is a serious step which might be harmful even from the point of view of further vocational education; that the scheme is rather expensive; that one should not expect from the pupils of this kind of prevocational training a considerable advantage for their future technical education; that a time-table of 40 hours a week, plus home-work seems to be rather crowded for 12 - 14 year old youngsters.

(iii) Two-year High schools - Technical trend:

The Ministry of Education and Culture introduced a two-years' curriculum in high schools for encouraging the parents of boys and girls who cannot afford the expenses for complete high school studies, or whose children seem not inclined or especially able for extended theoretical studies, to continue their schooling for another two years. In these two-years' schools, there are three trends: General, agricultural and vocational. In the vocational trend the pupils have 46 hours a week including 28 hours general education, 15 hours workshop practice and 3 hours related subjects. As graduates of these classes were found lacking in general education (compared with normal high school classes) and in vocational education as well, (compared with regular apprentices or ordinary vocational school pupils), it was decided to turn these classes into two-years' vocational schools.

Quite a number of new ways were tried out for enabling young people of different social and educational background and different capacities to find their way in life. Here we want to stress only the following:-

(iv) Pre-employment Apprenticeship Courses:

These courses were introduced because not all graduates of elementary schools are at the age of 14 able to stand the stress of the free labour market. An additional reason was the fact that vacancies for apprentices were scarce in many trades and the Ministry of Labour was interested in encouraging employers to take in more youngsters, by preparing them in advance. It was impossible to rely in Israel on the solution which was found in other countries, where large firms have their own apprentices' schools, as Israeli factories are generally much too small and economically not well enough based for facilitating the carrying out of so expensive projects. These courses are held in training centres for adults and in vocational schools for a period of three to twelve months. The costs amounting for a one-year course to about 500 Israeli Pounds per pupil. The pupils are paying a part as school fees, but 2/3 are up to now almost completely on the Government's shoulders. The week includes in most trades 46 hours of instruction: 32 hours workshop practice and 14 hours related subjects and general education.

This project proved to be very successful, as many parents find this bridge between school and the hardships of life useful in a country where ordinary compulsory education ends around the age of fourteen.

There was never any difficulty in finding vacancies for graduates of these courses. This success should not mislead the authorities into widening the range of these courses without fixing clear criteria. Otherwise they turn into subsidies to industries which should train their skilled manpower without enjoying the benefit of considerable public contribution.

(v) Sandwich Courses:

The Ministry of Labour tried in the Tel-Aviv area for some years a sandwich system of vocational education, which seemed to eliminate many of the dark sides of apprenticeship and those of full-time institutional education. All participants worked during their training period by turns - three months as apprentices in a workshop or factory and three months they were pupils in special classes in a vocational school. Thus one apprentice place was allocated to two boys, one of them always in school and the other in the workshop. The apprentices earned enough for paying their school fees and having left some pocket money, answering in this manner the needs of their own income, but were not dependent on their childrens' wages. The applicability of the scheme in Israel was from the very beginning limited as its usefulness is conditional to the existence of a sufficient number of apprentices and apprenticeship vacancies in the same trade and in the same stage of learning and teaching, for making it possible to build up homogenous classes on an economic basis. This seems possible in larger, highly industrialized towns only. The achievements reached by these pupils were astonishingly high, generally higher than those of the average apprentice and their sense of orientation, their readiness of adjustment to new situations compared favourably with those of vocational school graduates. It is too early to assess their prospect of progress as adult skilled workers. We learnt indeed, that the success of this kind of sandwich training depends on permanent, almost daily contact of the liaison officer with the boy, the workshop and the school - a budgetary as well as a manpower problem.

(vi) Adolescents' Training:

Two groups of youngsters induced Government to look for new solutions: Graduates of elementary school, who at the age of 16 or 17 were unsettled from an occupational point of view, and pupils of high schools, who dropped out after the first two or three years. Although it was conceivable to have special accelerated training courses for these boys and girls, it was decided against such a project, as a general solution, as at the age of 18 - after one to two years' training - all of them would have to serve in the Army for 2½ years and most of their newly acquired skill and knowledge would be lost by such a long break. Therefore, the Ministry of Labour established in consultation and in agreement with the Army, adolescents' courses only in civilian trades, in which the Army was interested too and ready to keep the young soldiers during their national service. The Army, as well as the labour exchanges are very satisfied and a solution was found for these youngsters. The pupils are kept in these courses till they are called up by the Army.

(vii) Vocational Youth Centres in Development areas:

A special employment problem exists in development areas, where plans for industrialization are in progress, but are not advanced enough for absorbing already the total potential labour force. As head of fa-

milies are naturally the first to be sent to work, young people are left behind. In these areas educational facilities above elementary school level are scarce. Thus 14 Youth Centres were set up in which boys and girls spend half a day working - mostly on Government works and are being paid for it. The other half is devoted to learning a trade or occupation, and supplementing their general education. As their final placement is not yet known and as industries in these areas will need machine operators and semi-skilled workers, many are prepared for their future occupational life by general technical education and by familiarizing them with working habits. They can stay in Centres up to two years, but whenever they find employment, they are free - and encouraged - to leave. For a transition period, these centres fulfil socially and educationally an important mission

(c) Adults.

Accelerated training courses for adults exist all over the country sponsored by the Ministry of Labour. As most of the families are new immigrants, the curriculum has to include general education subjects, especially languages, mathematics and citizenship.

(i) General Education:

Courses for adult candidates for crafts' training: As lately the employment situation improved and reached sometimes in certain places a point of lack of manpower, the choice of suitable candidates for training was limited and often it was impossible to find people with satisfying standard of general education for building sufficiently upon it modern vocational training. A boarding school was set up in which soldiers in the last three months of the period of their national service, get refresher courses in Hebrew, arithmetic and some other subjects of general education. It is yet too early to judge the results.

(ii) Training of Semi-skilled workers:

The new industries in development areas employ a large number of semi-skilled workers whose training can well be carried out "on-the-job". The process is however often hampered by lack of experience on the part of foremen. Sometimes productivity of the new workers is for many months so low that the new factory, working generally under unfavourable conditions, is unable to pay minimal wages. In these cases, the Ministry of Labour takes eventually the training programme under its auspices, sending from time to time its inspectors for consultations and paying for a limited time, part of the wages. Thousands of new workers found in this way permanent employment and new factories were able to build up in an efficient way a reliable staff of semi-skilled workers.

(iii) Observation Centre for the handicapped:

Whereas the ways of rehabilitation of disabled persons in Israel are rather conservative, following mainly the experience of other countries and adjusting it to local conditions, it was found that in the chain of vocational guidance facilities existing, one link was lacking: A Centre where physically and mentally handicapped persons could test their own strength, abilities and inclinations and where they could be observed and finally advised by an experienced team of instructors, physicians, psychologists, social workers, physio-therapists and employment counsellors. A Centre which was established and equipped with tools, machines and material, not on a trade basis but on the assumption that it should be adapted to basic manipulations which occur in various crafts and industries.

Disabled persons are generally accepted after the completion of their medical rehabilitation. All 85 persons who passed up to now the Centre, were before their entrance, for many months unemployed - some for years - living on a public assistance. Sixty seven found afterwards employment, following the advice of the team. It has to be stressed that almost all of them had already, without getting useful advice, passed the regular stations of vocational guidance. In the Observation Centre they were kept between two and six weeks. This scheme was found to be very successful and it was decided to open similar centres in other places.

(iv) Training of Foremen, Technicians and Instructors:

There would not be much justification in calling Israel training programmes for foremen, technicians and instructors, original or experimental. The experimental side one has to see in the concentration of these three training fields in one national institute, which seem especially suitable for poor, newly developing centres, lacking in highly skilled manpower. Personal and educational qualifications of candidates are similar, many study subjects that are common to all three types of curriculum; therefore, many teachers can be used by any trend of the institute. Even workshop and laboratory equipment is similar enough for being used by all three student bodies. Another advantage is the ease with which students can move from one trend to the other, if their former choice should prove wrong. In Israel such an Institute was established with the help of the Special Fund of the United Nations and with the assistance of the International Labour Organization. About 500 adult students are studying towards one of these careers. It is yet too early to draw conclusions, as only a few pupils finished their studies.

3. Further projects in stage of planning

(a) A plan for establishing in one of the new development towns a comprehensive school, including a general high school and a vocational school was worked out. The general high school will be run on two different levels only, one leading to matriculation. In the vocational school too, there will be two trends - the first stressing workshop practice and the second putting more weight on related subjects and general education. This type of institute is probably most suitable for small new immigrants' towns, where the number of children makes the maintenance of two or three different secondary schools impossible; where uncertainty in the choice of an aducational way makes flexibility imperative and where ambitions and prejudice of parents demand high school education - notwithstanding the manpower needs of the country or the abilities of their children.

(b) Industrialization of the development areas is not advanced enough for guaranteeing full employment in any case. On the other hand in many of these districts, there is full seasonal employment. The Ministry of Labour plans to establish in these areas pre-employment courses for adults during seasonal unemployment.

(c) It was decided to train in all elementary schools a certain number of teachers in elementary vocational guidance. These teachers will function under the supervision of fully trained psychologists. The first 60 teachers are now getting their training.

## 4. Conclusions

(a) Planning of vocational education is a function of manpower policy and general economic planning, taking into account demographic, social, psychological and general educational facts and conditions. Therefore, these plans, facts and conditions have to be well known and analysed before experiments in this field are undertaken. For that reason no conclusive decisions should be made without consultation between the different planning, economic, labour, statistic and educational authorities.

(b) In newly developing countries, in which the economic and technological future, the speed and direction of development is much more uncertain than in old established highly industrialized states, any blind sticking to principles taken over from other countries or read in books or heard from people, may be harmful. Other peoples' experience may be excellent raw material for independent thinking, but should never take the place of it.

(c) As other nations' experience should be known, but should not be taken over without critical screening and as newly developing countries are in the field of vocational guidance and education poor in tradition and own experience, there should be much readiness for experimenting, much courage to carry out experiments, to suffer disappointments and to correct mistakes and draw conclusions; governments should put at the disposal for experiments in vocational guidance and education, the necessary budget conscious of the much higher financial losses which might be incurred by unsuitable guidance and educational methods, leading in mild cases to exaggerated training periods and waste of manpower, in more drastic cases to inefficiency in production and damage to expensive equipment.

(d) In newly developing countries, where industry is not well established and not yet able to train all the skilled workers who will be needed tomorrow; where the financial reserves of the nation are generally too limited for training all skilled manpower in special schools, attention should be paid to training methods between exclusive on-the-job training by employers themselves and complete institutional vocational education paid mainly by the State. These methods were found very useful in the State of Israel and might, under similar economic, social and technological conditions prove suitable for others.

(e) As vocational education, like any education, can only flourish in a favourable public climate, the need cannot be overstressed for cooperation and coordination between different authorities in charge of it. The main question is not: who is responsible for vocational education. The cardinal problem is how to activate everybody concerned to participate in a constructive way - and who could be more concerned than the parents, the teachers, the children, the trade unions, the employers; in one word: the public ? ! Without their lively interest the best scheme must fail.



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# HUMAN RESOURCES AND THE APPLICATION OF SCIENCE AND TECHNOLOGY IN THE DEVELOPING AREAS

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## NOTES

1. Papers selected for inclusion in General Sessions will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

2. Papers selected for inclusion in Specialized Sessions will be available at the Conference in only one of the above official languages.

3. Summaries of all papers, as submitted by contributors, will be available at the Conference in the following official languages of the United Nations: English, French, Russian and Spanish.

4. Papers and summaries will not be available for general distribution in advance of the Conference. They will be published in advance in limited quantities only for the use of delegations of participating governments and of other authorized participants. Post-Conference publication and general distribution of the Conference Proceedings will follow United Nations practices as laid down by the United Nations Publications Board.

## 1. Population Growth in the Developing Areas

About two thirds of the world's people live in the so-called underdeveloped areas and generally, the populations of these areas have increased considerably during the past century. The growth in Asia has been and still is particularly remarkable, but large parts of Latin America, Africa, the Middle East and Southeastern Europe have experienced similar large population increases as well over the past century.

Estimates of the number of people in the main parts of the world since the 18th century show that the growth of population in the underdeveloped areas has occurred mostly in the past century and a half and has been particularly rapid since the beginning of this century. Southeast Asia and Oceania, for instance, gained only 8 million in population between 1700 and 1800, but the increase from 1900 to 1949 was 87 million. The population of the world as a whole increased by about one third from 1850 to 1900 and by more than one half from 1900 to 1949, compared with an increase of roughly one fifth from 1700 to 1750.

Not all the developing areas necessarily have unusually high rates of population increase. But even modest rates, compounded on an already large total, yield alarmingly large absolute increases in population in only a few decades.

This remarkable growth of population in the developing areas in recent times is almost entirely attributable to a decline in death rates. While in many areas of the world death rates are still high compared with the more highly developed countries, they have nevertheless fallen sufficiently in recent decades to cause a substantial population increase.

The decline in death rates in the developing areas, particularly since the beginning of this century, cannot - at least not for the period before 1940 - be attributed to economic development in the popular present-day sense of the term since little of that occurred.

The only plausible explanation seems to be that the increasing contacts of these areas with the Western world directly and indirectly brought about certain changes in these countries which resulted in lower death rates. Some of these changes were due to the spread of colonialism. Others were perhaps direct by-products of economic exploitation in the form of plantations and mining ventures. During the nineteenth century the expansion of the European economy to overseas areas greatly intensified its contacts with these economically underdeveloped areas and many Europeans migrated to these areas to assist in the exploitation of these areas' resources. While this economic penetration had great disruptive effects on the social and economic structure in these areas, it seems to have been primarily responsible for lowering mortality and thus disturbing the population equilibrium in these areas.

In this connection it must be borne in mind that in the wake of the Industrial revolution followed advances in medical science too, so that man could not only be cured from several diseases, but was also able to prevent the occurrence of such diseases. The consequence was a decline in death rates in the Western countries as was indeed evident since the last 150 years.

With the spread of medical science, and especially the introduction

of public health and other sanitation measures to other parts of the world, which went along with Western penetration into these areas, tendencies of declining death rates also began to set in in these areas.

Next to the improvement of public health measures in these areas, two other consequences of the Industrial Revolution must be mentioned which also directly assisted in bringing about a decline in death rates in these areas.

First, due to the Industrial Revolution man was increasingly able to apply his technical knowledge to increase material production, not only food, but also other commodities as well, which eventually resulted in lower prices of commodities and an increase of employment opportunities.

Second, due to the Industrial Revolution and the increase of human knowledge man was also increasingly able to apply new inventions, such as generating power, to other fields like communications and transportation, which thus resulted in a tremendous improvement of communications and transportation in these areas.

These improvements in transportation and communications made the transportation of food stuffs from one area to another area much easier and quicker so that, in most cases, famine could be averted in time.

In addition, cheap transportation made also possible the development of several economic activities in hitherto isolated regions. In this way additional land and natural resources could be used by the population, which thus also contributed to an increase in productivity.

Thus, the remarkable growth in population in the underdeveloped areas from around 1850 till the outbreak of World War II is apparently largely attributable, on the one hand, to the rise in productivity resulting from outside contact and exploitation and, on the other hand, to direct attacks on some of the most important causes of morbidity and mortality.

Evidence is accumulating that the now developing countries can probably lower their mortality rates more rapidly than the now advanced countries did in the past. This fall can be brought about without appreciable improvement in most of the usual economic indices of development. In other words, the rate of decline may be more rapid in the future and it may now be less dependant upon overall economic progress.

The primary reason why further declines in mortality in the developing areas may soon be dramatically rapid is that certain infectious diseases, which are still major scourges in these areas, have been virtually eliminated in the advanced countries by techniques easily, and often cheaply, be transferred to other parts of the world. The developing countries need only the material resources, the trained medical personnel and the requisite administrative efficiency to apply this knowledge on an extensive scale.

Thus, mortality rates in the developing areas can now be reduced very rapidly, and unless comparable declines in birth rates are to be expected, rates of population growth could be dangerously large.

Accordingly, unless an effort equal to that made for the control

of death is made for the control of fertility, and unless a reduction of births is achieved within a few decades, the hopes of the peoples of the developing countries may prove futile, because from the social welfare point of view, the crux of the development problems faced by most of the developing areas is to cause total output to grow faster than population.-

2. Economic Development and the Application of Science and Technology

It has been stated in the preceding paragraph that the rate of population growth has an important bearing on economic development, in that every population increase in a developing country could impede its economic development by swallowing up all the results of increased productivity.

Thus, the crucial problem for the developing countries is to increase, at least to maintain, the rates of technological, economic, and educational growth in excess of the rates of population growth in the developing countries. In other words, to achieve better conditions of life for the peoples in the developing countries, the accelerating of economic development in those countries in excess of population growth is imperative and a substantial increase in productivity in those countries is a principal prerequisite to raising the standards of living of the peoples in those countries.

In our opinion, the key to national prosperity and greater production, apart from the mentality and spirit of the peoples concerned, lies in the effective combination of three highly important factors, namely science and technology, natural resources and capital, of which the first - according to us - is the most important, since the creation and adoption of new scientific techniques can make up for a deficiency in natural resources and reduce the demands on capital. In fact, technology can only grow out of the study of science and its applications.

The outstanding charasteristic of this modern age is the intense cultivation and development of science on a large scale and its application to meet the requirements of the countries concerned. Science and technology can give, and has indeed given, to the majority of the peoples of countries advanced in science and technology a high standard of living and material, social and cultural amenities which in the past was only confined to a priviliged minority of the population.

Science and technology have developed at an ever-increasing pace since the beginning of this century, so that the gap between the advanced and the developing countries has widened more and more.

Accordingly, it is only by adopting the most vigorous measures and by putting their utmost effort into the development of science and technology that this gap between the advanced and the developing countries can be bridged.

In view of the growing importance of science and technology on the prosperity and well-being of the peoples in the developing countries, a well-considered national scientific policy ought, therefore to be one of the most important preoccupations of the govern-

ments of all the countries embarking on their national development effort. In this connection two main lines of action can be sugges ed for the governments of the developing countries, namely the carry ing-out of measures to furnish the necessary resources to develop and further scientific research and secondly, the application of scientific efforts not only to the increase of human knowledge in general, but especially to the economic and social welfare of all the peoples of the developing countries.

In this connection it is also important to bear in mind the highly important role that can be played in this matter by the United Nations and its Specialized Agencies.

It is only by the technical application of all the important results of scientific research that the benefits of the results of that research can be made available to the peoples of the developing countries. In the developing countries a higher standard of living and industrialization - which is a foremost prerequisite to the attainment of prosperity - can only be brought about by vigorous technical efforts which has to be based on all the relevant scientific and technological knowledge gained up until now. These purposeful efforts of harnessing scientific knowledge to a continuous technical effort with the purpose of bringing about specific changes in the methods of work and daily life of the peoples of the developing countries are among the most important and essential necessities of countries in the course of the process of economic development. For the economic progress of a developing country depend on the effective utilization of the human and natural resources of the country through industrialization and modernization of its agriculture.

It must readily be recognized, however, that there are great obstacles to any general technological progress in the developing countries that could well impede economic development. In this connection the lack of expert personnel and the lack of an efficient and effective technical organization can be mentioned as among the more important obstacles. The absorption of new technology in the developing countries is also a very difficult and costly process. Even in the case of relatively simple agricultural improvements there is need for a well-developed administration in government departments of agriculture, well-staffed with experts and technicians and having an extension service that can reach and teach the farmers. In general, it is also urgently necessary for these people to have at least a minimum level of education and literacy in order that widespread advances in technology can be achieved. Accordingly, a whole process of education has to be developed at all levels. Educational institutions have to be built up, without which this whole process cannot be developed and maintained at the proper level of effectiveness. A major obstacle to general technological progress is therefore the lack of an educational and administrative structure through which the producers can learn the new technology.

Education, however, must not be mentioned as merely a process of transmitting techniques, for what is also urgently necessary is a principal change in the outlook of the peoples of these developing countries. For it must be borne in mind that the technological progress in the Western countries is based on a long scientific tradition, a conception of nature leading to a spirit of exploration, discovery and experimentation.

Another important obstacle to the absorption of new technology is the social structure of many developing countries. The peoples of these countries will not be receptive to new technology unless the economic, social and cultural institutions are such as to stimulate individual initiative and incentive. Thus, in most of these countries social reform and a change in outlook are important prerequisites to technological progress.

Another important obstacle to technological progress in the developing countries is the lack of capital, without which technology cannot be utilized or cannot bear full fruits. For it must be kept in mind that technology and capital are joint complementary inputs in the same productive process, the use of either of which necessarily implies the use of the other. Technological progress involves the investment of capital in human beings and in training and teaching them in the new technology, in administrative processes for its transmission, in capital goods - which are in essence the carriers and embodiments of improved technology - and in social and economic overhead capital supporting and developing this whole process.

It must be borne in mind that in many cases the technology of already developed countries cannot be simply transferred to the developing countries, but frequently has to be adapted first to the needs of these latter countries, before it is suitable to them. Thus, considerable sums of money have to be invested in research into the specific needs of the developing countries concerned. Although sometimes this work can be done in the research institutes of developed countries, it is urgently required that many research institutes of this kind be established in the developing countries themselves which could conduct the necessary research to find the most suitable technology for the country concerned.

A problem also necessary to be mentioned here involves the training of higher personnel required to plan and execute economic development. For the time being it is evident that the developing countries will in many cases need to import technical and also administrative staff in many fields. We are of the opinion that in this matter the United Nations and its Specialized Agencies could play a major part next to bilateral agreements between developed and a developing country.

Thus plans for economic development have to start with the establishment and expansion of domestic institutions for training the technical and administrative personnel required at all levels.

Finally, attention has to be paid to the problem of mass education, for in order to secure rapid progress in all fields it is essential to secure the enthusiasm of the peoples of the developing countries for making a real effort toward economic, social and cultural progress.-

3. Upheaval and Adjustment

As stated in the preceding paragraph, technological progress - which is reflected in increasing modernization of agriculture and industrialization - constitutes, in our opinion, the most essential prerequisite towards securing a high standard of living for the peoples of the developing countries.

The process of technological progress , modernization of agriculture and, especially, the process of industrialization involve a process of social and cultural change. For industry represents, in most of the developing countries, a new form of productive organization, essentially foreign or external in origin, and thus involving direct and immediate changes in the pre-existing social structure of these pre-industrial societies. This break-up of the traditional social and cultural patterns is likely to lead to eruption and violence which can be harmful to economic growth.

It must be kept in mind that, in fact, technical change is as old as civilization, and that since time immemorial the ways of life of whole peoples have been transformed by the introduction of new tools and new technical procedures. Relationships between peoples, population balances, dynasties and whole religious systems have been upset by technological changes, just as the inventions and innovations which underlie these technological changes have themselves arisen from changing conceptions of the relation between nature and man. Nor is the attempt to control technological change new; rulers have tried to introduce new practices among their peoples, merchants have attempted to keep within national borders valuable technical processes and conquerors have educated the conquered so that the latter would fit in better within the scheme of conquest.

But what is new is the assumption, also on an international scale, of responsibility for introducing changes which are needed by the peoples in the developing areas which can benefit from the - primarily technical and scientific - knowledge which the peoples of advanced areas have. New also, and this is the most important thing, is the recognition and willingness to deal scientifically with the concomitant effects of such change.

It is, however, known generally that people resist changes that threaten something known, or at least something which has been a part of a known way of life. Therefore, ways of establishing a sense of need must be resorted to before proceeding with the change. The change must point to recognizable advantages; advantages sufficient to outweigh the losses to the people.

Development brings with it a rise of the levels of aspiration among the peoples of the developing countries. Thus, what is now vital to social and political stability is that these development efforts be accompanied by a sense of participation on the part of the peoples in the developing areas, and especially on the part of the individual of these societies. Needed also is a feeling among these people that those aspirations have a prospect of realization. In this connection it is most important that these aspirations of attaining a higher standard of living are not raised to impossible levels.

The people should not fear that the changes are being forced upon them because, in general, people resist forced changes. Ordering people to adopt a new thing or new ways may focus their attention and energies on resisting the command and on efforts to circumvent it, rather than on the advantages of the required change.

In general, it is advisable that, at least in the initial stages, new ideas and practices be introduced as far as possible in the guise of what is already familiar and acceptable.

Lastly, changes should be effected gradually, because all advance needs a stable basis in the peoples of the developing countries and in the social and cultural organization of these societies.-

4. The need for planning

In order to speed up the developmental process, this process has to be an induced and directed rather than a spontaneous, evolutionary process of change. As in most of the developing countries entrepreneurship is weak because the middle-class basis for it is missing, the role of the state is crucial in that it has to step into this vacuum.

The directed process of development entails the deliberate introduction of new equipment and techniques, and the systematic efforts to obtain their widespread, effective operation.

A unique value system, a complicated set of technologies, peculiar ways of life, and special patterning of societal organization run parallel with the introduction of machines and essentially different production techniques are being infused into the lives of the peoples of the developing countries.

Accordingly, a careful culture analysis is preliminary and fundamental to all else.

As stated in the previous paragraph, the growing influence of modern science and technology on the standards of living of all the peoples in the world, especially on those of the developing areas, should make national scientific policy one of the foremost pre-occupations of the governments of these developing countries. The governments of these countries should make it their utmost endeavour that the interaction between the encouragement of science, specifically scientific research, and economic and social progress runs as smoothly as possible to mutual benefit.

Thus, it must be constantly kept in mind that the problem of human resources, that is to say the peoples of the developing countries, and the problem of furtherance of science, especially the application of science and technology, as well as economic growth in itself need an extremely careful analysis and meticulous planning, each in itself as well as in relation to each other, by all the developmental agencies - public as well as private, national as well as international - so as to expedite economic development.-

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